

JPRS-UBB-86-002

8 January 1986

# USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES

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8 January 1986

USSR REPORT  
LIFE SCIENCES  
BIOMEDICAL AND BEHAVIORAL SCIENCES

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## AGROTECHNOLOGY

### RIZOFIL [SIC]--FOOD FOR ROOTS

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 8, Aug 85 p 36

TROITSKIY, N., Laboratory of Microbial Genetics, Institute of Genetics and Cytology, Belorussian SSR Academy of Sciences, Minsk

[Abstract] Rizofil [sic] is a novel formulation of Azotobacter which has been shown to be effective in improving crop yields as a result of its nitrogen-fixing activity. In addition to its use as a supplement to mineral fertilizers, it has also been shown to be highly effective as a feed additive in improving weight gain in agricultural animals, and as feed for zooplankton which is then used to feed fish in hatcheries. As an aqueous solution Rizofil is used to wet seeds before planting, or is applied directly into the soil with no danger of overdosage. The shelf life of this product is about six months, and the contents should be utilized immediately upon opening to avoid deterioration and contamination with other microorganisms. In view of the fact that Rizofil is newly available on the market, users are asked to communicate their experience with it to the Institute of Genetics and Cytology of the Belorussian SSR Academy of Sciences.

[012-12172/5915]

## BIOCHEMISTRY

### BIOCHEMICAL MODELS FOR STUDY OF NERVE CELL PROCESSES

Moscow MEDITSINSKAYA GAZETA in Russian 18 Sep 85 p 3

[Text] Biochemical models for the study of nerve cells have been developed at the Ukrainian Academy of Sciences' Institute of Biochemistry. Scientists will be able to deepen their knowledge of the human brain by using these models.

"A special place is reserved for neurochemistry in contemporary molecular biology," said V. Lishko, member of the Ukrainian academy and director of the institute. "Neurochemistry studies the most important processes in a living organism that are connected with neural control, memory and thinking. To understand the mechanism of these processes means to recognize the form in which the nervous system receives external and internal information and reacts to it. At the present level of research, we already know that special proteins which generate an electric signal are present in the membranes of excitable cells. This signal passes through nerve fiber to a specific organ, making it perform a certain action.

"Joint experiments by associates of the institute and other scientific organizations have made it possible to isolate and study these vitally important substances. Information that has been obtained will make it possible, in the near future, to develop preparations for treating diseases of the nervous system, as well as new anesthetics, and to take a step closer to the development of artificial memory systems built according to biological principles."

FTD/SNAP

/5915

CSO: 1840/062

## INTERACTION OF ASIALOGLYCOPROTEIN RECEPTOR OF HEPATOCYTES WITH CHEMICALLY GALACTOSILATED ACID ALPHA-GLUCOSIDASE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85  
(manuscript received 8 Apr 85) pp 994-996

BYSTROVA, N. K., Institute of Biological and Medical Chemistry, USSR  
Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on the interaction of a mouse hepatic asialoglycoprotein receptor with chemically galactosylated alphasglucosidase (AGC), to determine the feasibility of using such receptors for introducing AGC into hepatic lysosomes. The in vitro binding studies with AGC labeled with <sup>125</sup>I-p-aminophenyl-beta-D-galactopyranoside showed that binding was specific and predicated on the presence of the galactosyl residue in the AGC molecule. Various galactose-containing substances inhibited the binding to variable extent, with the greatest degree of inhibition exhibited by asialoorosomucoid. In addition, EDTA inhibited binding by more than 79%, confirming the dependence of binding on the presence of calcium ions, a characteristic feature of asialoglycoprotein receptors. Maximum specific binding was obtained in the pH range of 8.0-9.0. The data indicate that under in vitro conditions the receptor in question recognized galactosylated AGC as a specific ligand, suggesting that such enzymes can be introduced by this means into hepatic parenchymal cells. This suggests a means of enzyme therapy in such cases as type II glycogenosis. Figures 1; references 11: 7 Russian, 4 Western.  
[065-12172/5915]

## PROTEIN-PROTEIN INTERACTIONS IN SYSTEMS WITH SYNTHETIC POLYELECTROLYTES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85  
(manuscript received 5 Jun 85) pp 997-1001

MARGOLIN, A. L., SHERSTYUK, S. F., IZUMRUDOV, V. A., SHVYADAS, V. K.,  
ZEZIN, A. B. and KABANOV, V. A., corresponding member, USSR Academy of  
Sciences, Moscow State University imeni M. V. Lomonosov

[Abstract] An assessment was conducted on the efficiency of interaction of alpha-chymotrypsin (ACT) with its basic pancreatic inhibitor on the basis of kinetic data, using free ACT and ALT covalently linked to polyelectrolytes. Determinations of the association rate constants in pH 7.5 phosphate buffer at 25°C showed that for the free enzyme in solution, ACT-polymethacrylate complex, and for the CH-agarose linked preparation of ACT, the following values were calculated:  $2.8 \times 10^{-4}$ ,  $18.0 \times 10^{-4}$ , and  $1.4 \times 10^{-4} \text{ M}^{-1} \cdot \text{sec}^{-1}$ . The dissociation rate constants were, respectively,  $1.01 \times 10^3$ ,  $0.72 \times 10^3$ , and  $3.64 \times 10^3 \text{ sec}^{-1}$ . The respective inhibition constants for the three versions of ACT were  $3.60 \times 10^8$ ,  $0.40 \times 10^8$  and  $26.0 \times 10^8 \text{ M}$ . The data illustrate that the methods of enzyme linkage to polyelectrolyte carrier and the nature of the carrier have a profound effect on the binding behavior of the enzyme, and that such facts can be used to alter enzyme behavior toward desired end effects. Figures 2; references 11: 7 Russian, 4 Western.  
[065-12172/5915]



EFFECT OF INTENSIVE VISIBLE LIGHT ON ACTIVITY OF GLUTATHIONE  
PEROXIDASE IN PIGMENTED EPITHELIUM OF EYE

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 41, No 5,  
May 85 pp 24-27

[Article by N. R. Veliyeva, E. Yu. Yusifov and Sh. V. Mamedov, SFKhB  
Physics Institute, Azerbaijan SSR Academy of Sciences]

[Text] The study of functional visual damage caused by visible light is of considerable scientific and practical importance. Brief intensive and prolonged moderate illumination causes disruptions in photoreceptors and the pigmented epithelial cells of the eye [1, 2]. The observed morphological changes are apparently a result of more delicate photophysical and biochemical processes. In particular, free radical oxidative processes may play an important role in photo injuries to eye tissues.

We know that the cells contain an antioxidant protective system which includes vitamin E, the enzymes superoxidismutase, glutathione peroxidase (GP), and others. A highly active glutathione peroxidase was detected earlier in the pigmented epithelium (PE) of the frog [3]. The manner in which the antioxidant protective enzymes of the eye tissues react to intensive light exposure is as yet unclear. In order to clarify this phenomenon we investigated the effect of bright light on GP and PE activity in the retina.

Experimental Method

The experiments were conducted on *Rana temporaria* frogs. The light source was a xenon lamp DKSSh-1000. A 2.5% solution of copper sulfate, 10 cm in depth, was used as filter to separate the visible and infrared spectral regions. The frog was secured in place, and a system of lenses was used to focus the light on the animal's eye. The illumination intensity was 50,000 lx.

The illuminated and control frogs were decapitated following adaptation to darkness. The retina and PE were removed under red light. The tissues were homogenized in a 0.5 M phosphate buffer (ph 7.4). The homogenate was centrifuged in a TsLR-1 centrifuge (10,000 rpm) for 30 minutes. All operations were conducted on ice.

GP activity was measured in the supernatant by the Paglia and Valentine method [4]. The reaction mixture contained 1 ml of  $10^{-3}$  M EDTA, prepared in a 0.05 M phosphate buffer (pH 7.4),  $2 \cdot 10^{-4}$  M NADPHN,  $10^{-3}$  M reduced glutathione, 1.1 units of glutathione reductase,  $10^{-3}$  M tertiary butyl hydroperoxide, and 0.1 ml of supernatant. GP activity in the supernatant was determined by the oxidation rate of NADPHN (by the change in optical density at  $\lambda = 340$ ) at  $37^\circ$  and expressed in n moles of NADPHN, oxidized in 1 minute on 1 mg of protein. The amount of protein in the supernatant was determined by the Lowry method.

## Results and Discussion

The change in GP and PE activity in the frog retina was examined in relation to the total dose of illumination. The eyes of the first group of frogs were illuminated for 2 hours and decapitation was performed on the next day. The eyes of the second group were illuminated for 2 hours on each of 2 days which was followed by decapitation on the next day, and the third group was illuminated for 1.5 hours on each of 3 days. Decapitation in the last group was performed after a one-hour darkness adaptation period. The experimental results are presented in Table 1.

Table 1.

| Условия освещения (1)   | Образец (2)          | Активность ПЭ, моль<br>НАДФН·мин/мг<br>белка (3) |
|---|----------------------|--|
| 1 день по 2 ч (4)<br>с последующей 16–20-ч<br>темновой адаптацией | ПЭ контр. (7)        | $(49 \pm 10) \cdot 10^{-9}$                      |
|   | ПЭ освещ. (8)        | $(44 \pm 10) \cdot 10^{-9}$                      |
|   | Сетчатка контр. (9)  | $(13 \pm 3) \cdot 10^{-9}$                       |
|   | Сетчатка освещ. (10) | $(14 \pm 4) \cdot 10^{-9}$                       |
| 2 дня по 2 ч (5)<br>с последующей 16–20-ч<br>темновой адаптацией  | ПЭ контр. (7)        | $(89 \pm 12) \cdot 10^{-9}$                      |
|   | ПЭ освещ. (8)        | $(85 \pm 13) \cdot 10^{-9}$                      |
|   | Сетчатка контр. (9)  | $(27 \pm 6) \cdot 10^{-9}$                       |
|   | Сетчатка освещ. (10) | $(28 \pm 5) \cdot 10^{-9}$                       |
| 3 дня по 1,5 ч (6)<br>с последующей<br>1-ч темновой адаптацией    | ПЭ контр. (7)        | $(73 \pm 13) \cdot 10^{-9}$                      |
|   | ПЭ освещ. (8)        | $(99 \pm 14) \cdot 10^{-9}$                      |
|   | Сетчатка контр. (9)  | $(27 \pm 5) \cdot 10^{-9}$                       |
|   | Сетчатка освещ. (10) | $(25 \pm 6) \cdot 10^{-9}$                       |

### Key:

1. Illumination conditions
2. Specimen
3. GP activity, moles of NADPHN·min/mg of protein
4. 2 hours for one day followed by 16 – 20 hours of adaptation to darkness
5. 2 hours for 2 days followed by 16–20 hours of darkness adaptation.
6. 1.5 hours for 3 days, followed by 1 hour of dark adaptation
7. Control PE
8. Illuminated PEN
9. Control retina
10. Illuminated retina

As can be seen from the table, a two-hour illumination for one or two days followed by a 16-20 hour period of adaptation to darkness does not result in a noticeable change in retinal GP and PE activity. However, a three-day period of illumination does increase GP activity in PE by 36 percent, whereas activity in the retina does not change. The question then arises as to whether this difference is due to the large total dose of illumination or to the fact that the animals of the third group were allowed to adapt to the darkness for only one hour?

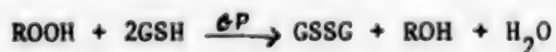
In order to answer that question we illuminated the frogs for a total of 2 hours and decapitated them after one hour of adaptation to darkness.

We found that the GP activity in the ocular PE of the experimental animals increased by approximately 90 percent (Table 2). Apparently, a 16-20 hour period of adaptation to darkness following illumination of the animals brings the level of GP activity in PE back down to the initial level.

We did not detect any marked difference between the GP activity in the ocular PE of the experimental and control animals in in vitro experiments where the PE and retina removed from the eye were exposed (30 minutes and 60 minutes) to visual light of the same intensity. A 60-minute exposure resulted in a general reduction of GP activity in PE (Table 2).

It follows from the aforementioned results that exposure to intensive light "switches on" the antioxidant protective system in the PE which leads to the synthesis of new GP molecules or possibly, the activation of those that are already present. Judging from the in vivo experiments, this would seem to take place throughout the entire organism.

It is interesting to note that when one eye of the frog was illuminated (the second non-illuminated eye was used as the control), elevated GP activity was observed only in the PE of that eye. The GP level of activity in PE both in the non-illuminated eyes and the eyes of the control animals maintained in natural light remained the same (Table 2). The intense light probably initiates the free radical oxidative processes in the PE cells during which there is an accumulation of "harmful" peroxides which must be removed. This task can be successfully accomplished by GP which catalyzes the reaction:



The elevated GP activity in PE is apparently the organism's response to the intensification of the oxidative process in the exposed eye. Inasmuch as the GP itself is not a photoreactive enzyme, one might assume that its increased activity in PE is initiated by another mechanism that is possibly associated with the higher concentration of GP substrate — the hydroperoxide of fatty acids.

Table 2

| Условия освещения (1)  | Образец (2)  | Активность ГП, моляр<br>НАДФН-мин/мг<br>белка (3)   |
|--|--|---|
| In vitro (4)<br>30 мин   | ПЭ освещ. (5)<br>ПЭ контр. (6)   | $(87 \pm 8) \cdot 10^{-9}$<br>$(82 \pm 8) \cdot 10^{-9}$  |
| In vitro (7)<br>60 мин   | ПЭ освещ. (5)<br>ПЭ контр. (6)<br>Сетчатка освещ. (8)<br>Сетчатка контр. (9)   | $(27 \pm 7) \cdot 10^{-9}$<br>$(36 \pm 7) \cdot 10^{-9}$<br>$(20 \pm 4) \cdot 10^{-9}$<br>$(20 \pm 4) \cdot 10^{-9}$  |
| In vivo (10)<br>2 ч с последующей<br>1-ч темновой адаптацией                     | ПЭ освещ. (5)<br>ПЭ контр. (6)<br>Сетчатка освещ. (8)<br>Сетчатка контр. (9)   | $(79 \pm 14) \cdot 10^{-9}$<br>$(41 \pm 8) \cdot 10^{-9}$<br>$(13 \pm 3) \cdot 10^{-9}$<br>$(13 \pm 3) \cdot 10^{-9}$ |
| In vivo (11)<br>одного глаза 2 ч с последу-<br>ющей 1-ч темновой адапта-<br>цией | ПЭ освещ. 1 глаза (12)<br>ПЭ неосвещ. 1 глаза (13)<br>Сетчатка освещ. 1 глаза (14)<br>Сетчатка неосвещ. 1 глаза (15) | $(72 \pm 12) \cdot 10^{-9}$<br>$(45 \pm 8) \cdot 10^{-9}$<br>$(16 \pm 4) \cdot 10^{-9}$<br>$(15 \pm 3) \cdot 10^{-9}$ |

## Key:

1. Conditions of illumination
2. Specimen
3. GP activity, moles of NADPHN-min/mg of protein
4. In vitro, 30 minutes
5. Illuminated PE
6. Control PE
7. In vitro, 60 minutes
8. Illuminated retina
9. Control retina
10. In vivo, 2 hours, followed by a one-hour darkness adaptation
11. In vivo, of one eye for 2 hours, followed by a one-hour darkness adaptation.
12. Control PE of one eye
13. Non-illuminated PE of one eye
14. Illuminated retina of one eye
15. Non-illuminated retina of one eye

This kind of GP activity behavior in PE cells is in agreement with the data of other studies which indicate that various stress factors such as hypoxia, ozone action, and others result in heightened GP activity in various animal tissues. [6 — 8].

We have thus shown that GP activity increases in the PE of a frog's eye in response to intense light, and that this is apparently associated with the adaptive response to intensified free radical oxidation reactions in the eye's tissues. This result confirms the important role of glutathione peroxidase in the pigmented epithelium of the eye.

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CSO: 1840/005



UDC 547.915.5.07:577.352.27:577.152.311

TWO-DIMENSIONAL  $^{31}\text{P}$ -NMR SPECTROSCOPY OF MODEL LIPID MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 1, Sep 85  
(manuscript received 5 Mar 85) pp 216-220

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[Abstract] Pulsed sequences from J-RESOLVED AND NOESY programmed software of a Bruker WM-250 spectrometer were used to study the applicability of two-dimensional spectroscopy methods to model phospholipid membranes. Samples of phosphatidylcholine, phosphatidylethanolamine, diphosphatidylglycerine and synthetic dipalmitoylphosphatidylcholine were used to prepare models, all of which were prepared in heavy water. The study showed the possibility of use of two-dimensional  $^{31}\text{P}$ -NMR spectroscopy of wide lines of the model membranes. The pulsed sequence NOESY provided qualitative information about dipole exchange and metabolic interactions in the polar region while the J-RESOLVED sequence provided quantitative information about intramolecular dipole-dipole  $^{31}\text{P}$ - $^{31}\text{P}$  interaction. Figures 3; references 8: 1 Russian, 7 Western.  
[008-2791/5915]

UDC 612.822.8:612.822:616-003.725

EFFECT OF  $\text{Ca}^{2+}$  IONS ON CHANNEL-BLOCKING ACTION OF HEXAMETHONIUM IN SYMPATHETIC GANGLION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 1, Sep 85  
(manuscript received 21 Jan 85) pp 225-228

SELYANKO, A. A., DERKACH, V. A. and SKOK, V. I., academician, UkSSR Academy of Sciences, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev

[Abstract] An attempt to explain whether or not the channel-blocking effect of hexamethonium ( $\text{C}_6$ ) depends upon the extracellular concentration of  $\text{Ca}^{2+}$  ions involved experiments on rabbit upper cervical ganglion neurons at  $36^\circ\text{C}$ . Membrane potential in the neurons was recorded with the aid of two intracellular microelectrodes filled with a 3M solution of KCl. Rapid exciting

post-synaptic current was induced by a single stimulation of the cervical sympathetic nerve. Increase of  $\text{Ca}^{2+}$  level in the medium increased the amplitude and prolonged the drop of the exciting post-synaptic current. Increase of rapid exciting post-synaptic current is attributed to the presynaptic effect of  $\text{Ca}^{2+}$  which increases the quantity of the transmitter being released from the nerve endings. The effect of  $\text{Ca}^{2+}$  on kinetics of operation of nicotinic cholinoreceptor ionic channels may be realized through a change of cell surface potential or by direct interaction of  $\text{Ca}^{2+}$  ions with ionic channels of nicotinic cholinoreceptors. It was assumed that the channel-blocking action is realized through the structure of the ionic channel participating in normal operation of the receptor, as was reported previously. Figures 2; references 15: 4 Russian, 11 Western.  
[008-2791/5915]

DISCOVERY REGARDING ELECTRON REDISTRIBUTION AMONG CELL MEMBRANES

Moscow IZVESTIYA in Russian 27 Sep 85 p 3

[Article by I. Novodvorskiy]

[Excerpt] On September 26, 1985, the USSR State Committee on Inventions and Discoveries recorded a discovery made by a group of scientists of the Moscow State University and the Moscow Medical Institute No 2: V. Skulachev, corresponding member of the USSR Academy of Sciences; Doctor of Biological Sciences A. Archakov; and Candidate of Biological Sciences A. Karyakin.

In 1974, the authors of the discovery experimentally discovered transfer of electrons both between individual membranes inside a cell and between cells in an organ or tissue. This process of redistribution of electrons between membranes combines all membranes into a single coordinated system.

A new type of physical chemical reactions in cells was thus discovered.

The fact that these reactions are retarded and inhibited in a number of illnesses which involve changes in cells constitutes an important practical application of this discovery. This can aid in diagnosis of serious human illnesses.

FTD/SNAP

/5915

CSO: 1840/062

UDC 577.352.27

# EFFECT OF PHOSPHOLIPID METABOLITES ON MODEL MEMBRANE FUSION

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 8, Aug 85  
(manuscript received 6 Mar 85) pp 789-794

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[Abstract]  $^{31}\text{P}$ -NMR spectroscopy and formation of fluorescent complexes between  $\text{Tb}^{3+}$  and dipicolinic acid were used to monitor liposome fusion and the effects of phospholipases C and D on the process. Phospholipase C was found highly efficient in initiating liposomal fusion, regardless of the phospholipid composition of the bilayer membranes. However, phospholipase D promoted liposomal fusion only in cases in which the membranes contained high concentrations of phospholipids incapable of forming bilayer membranes, such as phosphatidylethanolamine and cardiolipin. The mechanism of action of both enzymes in promoting liposomal fusion was ascribed to the generation of a metastable state in the membranes as a result of enzymatic formation of lipophilic metabolites 1,2-diacylglycerol and phosphatidic acid. The perturbation, or fluidity, of the liposomal membranes favored fusion on contact. Figures 4; references 21: 2 Russian, 19 Western.  
[036-12172/5915]

UDC 577.352.465

# ACTIVATION OF $\text{Ca}^{2+}$ INFLUX INTO CELLS BY RICIN B-SUBUNIT

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 8, Aug 85  
(manuscript received 22 Feb 85) pp 800-805

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[Abstract] Human thrombocytes were employed to test the hypothesis that the B subunit of ricin promotes the ingress of the A subunit in cells by activating  $\text{Ca}^{2+}$  transport into the cell. Under the experimental conditions employed the B subunit in a concentration of  $3.5-7 \times 10^{-8} \text{ M}$  induced the intracellular

increase of  $\text{Ca}^{2+}$  from 120 to 600 nM. The effect of the B subunit was to increase both the intracellular concentration of  $\text{Ca}^{2+}$  and the rate of influx in a dose-related fashion, to a maximum intracellular  $\text{Ca}^{2+}$  concentration of 2-3  $\mu\text{M}$ . The effects of the B subunit were abrogated by pretreatment of the thrombocytes with lactose, as well as by such calcium antagonists as verapamil and lanthanum ions. In addition, the fact that prostaglandin  $\text{E}_1$  also has an inhibitory effect on subunit B-mediated calcium elevation provides further confirmatory evidence that calcium receptors are involved in the effects exerted by the B subunit. The data appear to indicate that the B subunit of ricin promotes calcium influx into cells by activating specific calcium channels in the plasma membrane. Figures 7; references 15: 4 Russian, 1 Western.  
[036-12172/5915]

UDC 577.352.26

# DETERMINATION OF LINEAR TENSION OF BILAYER LIPID MEMBRANES FROM MEMBRANE LIFETIME DATA IN ELECTRIC FIELD

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 8, Aug 85  
(manuscript received 22 Jan 85) pp 813-819

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[Abstract] A mathematical analysis was conducted on the stress factors leading to electrical breakdown of bilayer lipid membranes, by relating the linear tension factor to membrane lifetime in relation to applied voltage. Experimental studies with 8 membranes prepared from different lipids provided further confirmation for the involvement of pore formation as a factor leading to membrane destruction in an electric field. Although no molecular presentations of pore structure could be made with certainty, the decrease in linear tension with an increase in pore radius suggested that as the size increased the pores became more hydrophilic. Regardless of the nature of changes in the linear tension, the experimental and theoretical considerations support the contention that electrical breakdown of bilayer lipid membranes is adequately described by standard equations relating linear tension, surface tension and pore radius. Figures 2; references 13: 4 Russian, 9 Western.  
[036-12172/5915]



# THERMAL FLUCTUATIONS AND CAPACITANCE OF BILAYER LIPID MEMBRANES IN ELECTRIC FIELD

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 8, Aug 85  
(manuscript received 16 Apr 85) pp 820-831

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[Abstract] Theoretical and experimental studies were conducted on symmetrical and asymmetrical fluctuations in bilayer lipid membranes induced by the application of an electric field, as a means of explaining changes in capacitance. Studies on the relationship between applied voltage and capacitance have shown that a change in capacitance of as much as 1% can be attained with a 100 mV potential. The degree of change in capacitance is predicated on stress force and the flexular modulus of the individual monolayers. These considerations indicate that the most likely mechanism underlying the rapid increase in capacitance that occurs within 10  $\mu$ sec or less of voltage application involves enhanced thermal fluctuations in the membrane. Figures 2; references 24: 8 Russian, 16 Western.  
[036-12172/5915]

UDC 663.18.576.8

# STUDIES ON INTERPHASE TURBULENCE AND OXYGEN TRANSPORT IN BIOLOGIC MEDIA BY HOLOGRAPHIC INTERFEROMETRY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85  
(manuscript received 5 Mar 85) pp 986-990

VINAROV, A. Yu., KAFAROV, V. V., academician, BYKOV, V. A., SHITIKOV, Ye. S. and KARLOV, S. P., Moscow Institute of Chemical Technology imeni D. I. Mendeleev; All-Union Scientific Research Institute of Biosynthesis of Protein Substances, Moscow

[Abstract] This communication is cited as the first experimental study on the use of holographic interferometry in determination of interphase turbulence and oxygen transport in a biologic medium. The biologic medium consisted of a Candida culture grown on petroleum hydrocarbons, while control data were obtained for a 2% sodium sulfite solution with Cu ions. Analysis of the interferograms for both samples demonstrated marked differences. In the sodium sulfite solution, the deformations were largely limited to the gas-liquid interface and the extent of interphase turbulence was much less pronounced than in the biological system. The biological system displayed sharp deformation bands throughout the bulk in the form of lamellar structures. Changes in the physical chemical parameters of the biosystem made possible an evaluation of oxygen transport in the medium and its uptake by the yeasts. Mass transfer of oxygen increased by 50% on an increase in the temperature of the biosystem from 21 to 28°C, and by 30% when the pH was adjusted from 7.0 to 4.5. The ratio of mass oxygen transport in the biosystem to the sodium sulfite system was 0.78, in agreement with data obtained by conventional techniques. Figures 3; references 9: 8 Russian, 1 Western.  
[065-12172/5915]

PRODUCTION OF GENE BANK FROM COTTON PLANT CHLOROPLAST DNA

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSOY SSR in Russian Vol 28 No 3, Mar 85 pp 175-178

[Article by M. Karimov, G. V. Afanasyeva, N. I. Matviyenko, Institute of Plant Physiology and Biophysics, Tajik SSR Academy of Sciences; Branch of the Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences; Protein Institute, USSR Academy of Sciences]

[Text] Researchers in the field of genetic engineering have recently focused their attention on the development of model systems that would make it possible to express eukaryotic genes. One of the possible genetic systems created in the process of natural selection is the symbiosis of *Agrobacterium tumefaciens* with higher plants which is used to insert foreign genes into plants [1]. In our opinion, of no less interest are the plasma genes that are located in the cytoplasm organelles of higher plants, particularly in the chloroplasts. Chloroplast DNA has enough information for the synthesis of a number of protein structures, and its amplification level allows one to rely on the expression of its own DNA and "foreign" DNA altered by genetic engineering techniques. We know that ribosomal RNA genes of plastids and a large subunit of riboso-diphosphate carboxylase are encoded by a chloroplast gene. Apparently, the insertion of strong promoters into these genes and their supplemental modification can significantly affect the level of photosynthetic activity in plant tissue. There have been practically no studies in this area. One of the stages in changing a genetic program of agricultural plants is the creation of a gene bank of chloroplast DNA.

The cotton plant, which is the most important agricultural crop of Tajikistan, was selected as the object of our study. The plants were grown in a phytotron on a synthetic medium for 15 - 17 days. The leaves were pulverized and were processed by an enzyme method which we had proposed earlier [2]. In that connection, instead of cellulysin, we used a 6% percent solution of macerase (Calbiochem), and the treatment was conducted at room temperature. After the protoplasts were crushed we used proteinase K in the presence of a 2% solution of sodium sarcosylate. The chloroplast DNA, separated in a CsCl gradient, was subsequently fractionated on biogel A-50 (Bio Rad) and stored at -70°C.

The DNA of phage  $\lambda$  CI 857, whose molecular weight is 28 megadaltons, was used as a DNA standard to determine native chloroplast DNA by electrophoresis in a 0.8% agar gel.

Separation of the DNA of phage  $\lambda$  L 4 and the preparation of the vector was basically carried out by the Maniatis method [3]. The endonucleases Bam HI and Sau 3 A were used for the restriction of chloroplast DNA.

The chloroplast DNA and the DNA of phage  $\lambda$  L 47 were annealed in a buffer (containing 50mM of tris-HCl, pH 8.0, 35 mM of  $MgCl_2$ , and 500 mM of NaCl). The DNA vector molecules were subsequently packed with the chloroplast DNA insertions into the virions of phage  $\lambda$  by utilizing the reaction suggested by Grosveld [4].

The production of DNA gene banks of eukaryotic cells, particularly from cytoplasm organelles, requires a higher degree of macromolecular DNA purity. The conventional methods of extracting nucleic acids from higher plant plastids that employ the homogenization of plant tissue [5], lead to the destruction of large segment of DNA in the fractionation process and, in our opinion, are not very suitable for molecular-genetic studies, particularly in cloning experiments. At the same time, the enzyme method has certain advantages that make it possible to obtain native protoplasts at the initial stages with a high yield of intact chloroplasts whose lysis does not present any special problem [2]. The supplemental removal of protein impurities is possible at the stage of chloroplast lysis with the aid of proteinase K and the effective deproteinizing action of nucleases. No less important is the subsequent chromatography of the DNA preparation of chloroplasts on biogel A-50 which makes it possible to avoid completely ribosomal RNA admixture in a single procedure (Diagram 1). The electrophoresis data in a 0.8% agar gel indicate that the DNA produced by this method is a high polymer and is close to the molecular weight of the DNA of phage  $\lambda$ , i.e. the molecules' basic part has a molecular mass of from 25 to 30 megadaltons. This indicates that there are no more than three to four cleaves per molecule in the chloroplast DNA since the molecular weight of this DNA in higher plants is about 90 megadaltons.

The next step in the cloning of "foreign" DNA genes is the selection of the conditions for DNA restriction. Diagram 2 illustrates the effect of the nucleases Bam HI and Saus 3A on chloroplast DNA of cotton. DNA restrictions of phage  $\lambda$  CI 857, obtained by the action of the endonuclease EcoRI (the extreme left-hand column) were used to mark molecular weight. As a working model of this process, we employed conditions that would allow complete restriction hydrolysis by Bam HI and partial hydrolysis by the endonuclease Sau 3A which form smaller fragments of chloroplast DNA.

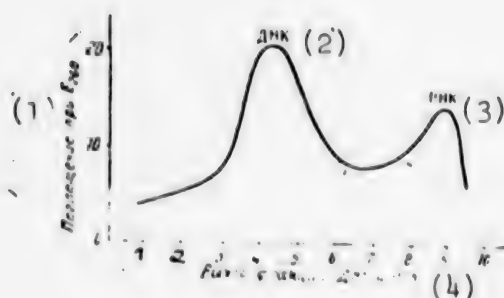


Diagram 1. Purification of Chloroplast-DNA on Biogel A-50

Key:

1. Absorption at  $E_{260}$
2. DNA
3. RNA
4. Yield of DNA and RNA fractions

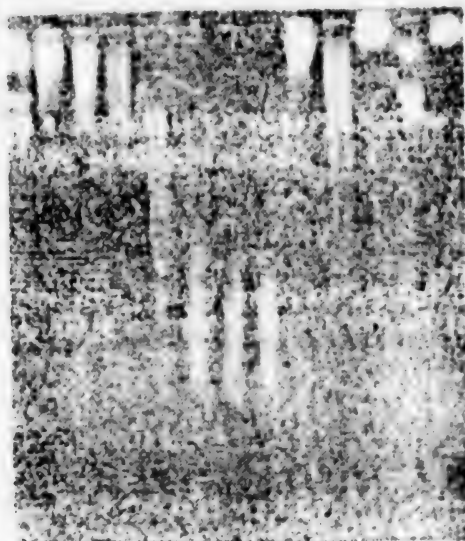


Diagram 2. Selection of Chloroplast-DNA Restriction. Columns from left to right: 1 -  $\lambda$ L, 2 -  $\lambda$ L 47-R-Bam HI, 3 -  $\lambda$ L 47, 4 - Chloroplast-DNA-R-Bam HI, 5 - Native Chloroplast-DNA, 6 - 12 - Chloroplast - DNA - R - Sau 3A, 13 -  $\lambda$ Cl - R - EcoRI.

The conditions for cleaving the vector DNA of phage  $\lambda$  L47 were selected so that complete hydrolysis would be achieved. A subsequent check of the extent of hydrolysis in the agar gel and the packing of DNA into virions in a system containing lysates of *E. coli* BHB 2690 and BHB 2688, demonstrated the high efficiency of the packing mixture, which ranged from  $7 \times 10^6$  to  $1.2 \times 10^8$  per mcg of DNA.



These figures agree with the data in the literature [6]. The packing effectiveness of the restricted DNA preparation of phage  $\lambda$ L47 was equal to zero.

The correlation between the donor DNA insert and the DNA of the phage  $\lambda$  arms was closely watched in the annealing of the vector DNA of phage  $\lambda$ L47 to the donor DNA of the cotton plant chloroplasts. In that regard, the size of the insert, on the average, should not exceed 15 - 20 thousand nucleotide pairs. This corresponded to the maximum sizes of the chloroplast DNA restrictions. The optimal ratio of vector to donor DNA should be about 1:1. The results of annealing are illustrated in Diagram 3, from which one can see that the restored vector DNA has a molecular weight that is close to the weight of the native DNA of phage  $\lambda$ L47.



Diagram 3. Annealing of Restricted DNA. From left to right the columns are:

1 -  $\lambda$ L 47-R-Bam HI, 2 - Annealed ( $\lambda$ L 47-R-Bam HI + Chloroplast-DNA-R-Sau 3A), 3 - Chloroplast-DNA-R-Sau 3A, 4 - Ann. ( $\lambda$ L 47-R-Bam HI + Chloroplast-DNA-R-Bam HI), 5 - Chloroplast-DNA-R-Bam HI, 6 - Ann. ( $\lambda$ L 47-R-Hind III + Chloroplast-DNA-R-Hind III), 7 - Chloroplast-DNA-R-Hind III, 8 - Ann. ( $\lambda$ L 47-R-Bam HI) vector restoration, 9 - PBR-322, 10 - PBR-322-R-Hind III, 11 - Ann. (PBR-322-R-Hind III), 12 - PBR-322-RR Hind III, 13 -  $\lambda$ Cl 857.

The seeding of the packing mixture on culture Q 359 which makes it possible to select directly the recombinant molecules, demonstrated that most clones contain fragments of chloroplast DNA (Table). The use of restrictase Bam HI resulted in the production of 75 recombinant molecules, whereas 450 recombinant molecules were produced by using the restrictase Sau 3A. Since the size of the gene bank of cotton plant chloroplast DNA is 90 clones with a 0.99 probability that the required gene would appear (the average size of a genome is  $90 \times 10^6$  pairs of bases and the average fragment size

is  $7.5 \times 10^3$  pairs of bases), one can conclude that the recombinant clones isolated through the use of restrictase Sau 3 A constitute a representative gene bank of cotton plant chloroplast DNA.

Table 1. Results of In Vitro Packing

|  | (1)<br>ДНК вектора<br>и доноров                                 | Культура<br>для селек-<br>ции вектор<br>и рекомби-<br>нантов (2) | Культура<br>для селек-<br>ции реком-<br>бинантов (3) | Степень<br>эффектив-<br>ности в<br>упаковке<br>1 мл 1 мкг<br>ДНК (4) | Кол-во ре-<br>комбинант-<br>ных клонов<br>(5) |
|--|---|--|--|--|---|
|  |   |  |  |  |   |
| Лечение<br>(6)   | $\lambda$ L 47  | QR-43  | Q359   | $3 \cdot 10^4$   | —   |
|  | $\lambda$ L 47 - R - Bam HI +<br>+ Xp - ДНК - R - Bam<br>HI (7) | 126  | 3  | $1.2 \cdot 10^3$   | 73  |
|  | $\lambda$ L 47 - R - Bam HI +<br>+ Xp - ДНК - R - Sau<br>3A (7) | 583  | 18   | $7.5 \cdot 10^3$   | 450   |
| (8)<br>Примечание. R - рестрикция. Xp - ДНК хлоропластной ДНК. |   |  |  |  |   |

Key:

1. DNA of vector and donors
2. Culture for selection of vector and recombinants
3. Culture for selection of recombinants
4. Degree of effectiveness in packing 1ml 1 mcg of DNA
5. Number of recombinant clones
6. Annealing
7. Chloroplast-DNA
8. Remarks: R - restriction; Khp-DNA - Chloroplast DNA

We have thus demonstrated that the enzyme method of isolating protoplasts from cotton plant leaves followed by mechanical lysis and the lysis of chloroplasts in the presence of proteinase K and supplemental purification on biogel A-50, can result in the separation of a high polymer chloroplast DNA that has a molecular weight in the range of 25 - 30 megadaltons.

A representative gene bank of chloroplast DNA that numbers approximately 450 clones in the case of the restrictase Sau 3 A, was produced for the first time through the use of vector DNA molecules of phage  $\lambda$  L 47 and a donor DNA from cotton chloroplasts.



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6289

CSO: 1840/006

PRODUCTION OF  $\gamma$ - AND  $\alpha$ -INTERFERON BY HUMAN BLOOD LEUKOCYTES UNDER SUCCESSIVE INDUCTION CONDITIONS

Moscow VOPROSY VIRUSOLOGII in Russian No 2, Mar-Apr 85 (manuscript received 28 Jun 84) pp 196-198

[Article by T. G. Orlova, L. V. Zhdanova, M. N. Soloyeva and L. M. Mentkevich, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Text]  $\alpha$ - and  $\gamma$ -Interferons are known to be produced by different blood cells--by B lymphocytes in the former case and T lymphocytes in the latter [2,3]. This fact predetermines the possibility for simultaneous or successive induction of the same blood leukocytes by inducers eliciting formation of these types of interferon. When inducers interacting with different producer cells are used in this way, the interferon tolerance phenomenon is avoided. Moreover, successive induction means a savings of leukocytes, because the same cells can be used to obtain two yields of interferons.

Favorable results in research on production of human  $\gamma$ - and  $\alpha$ -interferons involving successive use of  $\gamma$ -interferon inducers--phytohemagglutinin (PGA) and staphylococcal enterotoxin (SEA), and an  $\alpha$ -interferon inducer--Newcastle disease virus (NDV)--are presented below.

## Materials and Methods

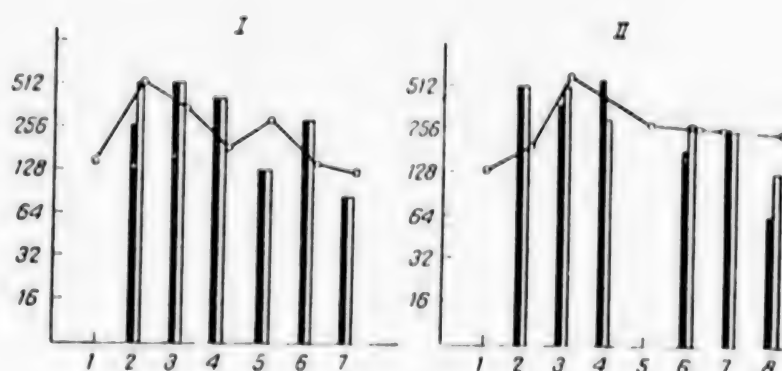
Interferon inducers PGA (Difco Laboratories) and SEA, graciously provided by Prof Yu. V. Yezepchuk and the Institute of Epidemiology and Microbiology imeni N. F. Gamaleya of the USSR Academy of Medical Sciences; NDV, strain H, in the form of chick embryo allantoic fluid (titer  $10^9$  IU<sub>50</sub>/0.2 ml). Immune interferon was induced by a method described earlier [1] using PGA-M at a final concentration of 1:20 or SEA at a dose of 1  $\mu$ g per  $10^7$  cells in 1 ml as inducers. The time of synthesis of immune interferon was from 1 to 7 days depending on the conditions of the experiment.

Leukocyte interferon was induced by NDV at a multiplicity of 10 IU<sub>50</sub>/cell. The time of its synthesis was 1 day. Virus was inactivated in interferon preparations by incubation at pH 2.2 for 5 days. During successive induction, first  $\gamma$ -interferon inducer was administered to leukocytes at the doses indicated above. Each day for 8 days subcellular liquid was collected from

individual samples as a source of  $\gamma$ -interferon, and in similar manner as with induction of control  $\alpha$ -interferon, NDV was administered to leukocytes. After 24 hours of incubation the culture fluid was collected, and following inactivation of virus and  $\gamma$ -interferon (pH 2.2 for 5 days), it was titrated for concentration of  $\alpha$ -interferon. Interferon was titrated by the micromethod using M19 human diploid cells on the basis of inhibition of the cytopathic action of 100 TTsD<sub>50</sub> [not further identified] of EMC virus.

## Results and Discussion

We studied production of  $\gamma$ - and  $\alpha$ -interferons by successive administration of the corresponding inducers in two series of experiments. In the first, PGA and NDV were used as the interferon inducers, and SEA and NDV were used in the second (see figure).



Production of  $\gamma$ - and  $\alpha$ -interferons by successive induction of human leukocytes by PGA and NDV (I) and by SEA and NDV (II): Curves show the dynamics of  $\gamma$ -interferon formation induced by PGA (I) and SEA (II). Light columns--production of  $\alpha$ -interferon induced by NDV in control leukocytes, shaded columns--in leukocytes processed with PGA (I) and SEA (II). NDV was administered 24 hours before material was sampled for determination of  $\alpha$ -interferon concentration. Ordinate--interferon titer (units/0.1 ml), abscissa--time (days).

As is evident from the figure, which presents the results of five experiments, blood leukocytes induced by PGA produced identical quantities of  $\gamma$ -interferon in the course of approximately 10 days. Its titers in culture fluid varied from 64 to 520 units/0.1 ml. The variations did not depend on the time of synthesis of interferon by leukocytes.

Leukocytes induced for the first 4 days by NDV produced  $\alpha$ -interferon in identical quantities (titers of 512 units/0.1 ml a day following administration of inducer); then their capability for synthesizing  $\alpha$ -interferon declined.

Leukocytes induced by PGA and synthesizing  $\gamma$ -interferon produced the same quantity of  $\alpha$ -interferon in response to administration of NDV as did control

cells (see figure, I). Out of 10 determinations, only 2 exhibited a two-order difference in quantities of interferon produced in control and experimental leukocytes. Similarly as in control cells, by the 7th day the capability of induced leukocytes for producing  $\alpha$ -interferon declined sharply.

Similar results were obtained in experiments conducted following an identical pattern, in which interferon was induced by administration of SEA and NDV (see figure, II). In these studies SEA evoked formation of approximately the same quantities of  $\gamma$ -interferon as did PGA (128-640 units/0.1 ml).

Administration of NDV to SEA-induced leukocytes was accompanied by  $\alpha$ -interferon production that was as high as in control cells. In the same way as in the experiments with PGA and NDV,  $\alpha$ -interferon production decreased somewhat in response to administration of inducer to 4-day and older leukocytes.

Considering these data, we believe that administration of  $\alpha$ -interferon inducer 2-3 days after induction of  $\gamma$ -interferon is optimum under these conditions. it insures the highest yields of both interferons.

As is evident from the data presented here, use of the method of double successive induction of the same human peripheral blood leukocytes makes it possible to obtain two yields of interferon from them-- $\gamma$  and  $\alpha$ ; moreover the intensity of their production did not decrease in comparison with control. This induction procedure ( $\gamma$ -interferon inducer followed by  $\alpha$ -interferon inducer) is technically convenient because it permits acquisition of both interferons without the need for additional procedures. Moreover this procedure requires twice fewer leukocytes.

All of this permits the conclusion that the procedure of double successive induction presented here can be used in natural interferon production laboratories.

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11004

CSO: 1840/020

## EPIDEMIOLOGY

UDC 616.931+616.918.8+616.98:579.852.11]-084.4(497.2)

### EXPERIENCE OF BULGARIA IN CONTROLLING DIPHTHERIA, TETANUS AND PERTUSSIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 84 pp 92-96

POLIKAR, A. Ch., SOLOMONOVA, K. M. and MIKHAYLOVA, V. P., Scientific Research  
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[Abstract] The article surveys progress in inoculation against diphtheria, tetanus and pertussis since the first introduction of mandatory vaccination in 1951. Improved diphtheria anatoxin, of higher purity and concentration, was put into use, and combined vaccines were introduced. The next improvements were aimed at reducing side reactions to the vaccines by reducing doses and increasing purity. Trial and adjustment approaches were used, essentially to find the minimum effective doses of DPT vaccine, which were introduced in the 1970s in a combined dose of 0.5 ml containing 12 Lf of diphtheria anatoxin, 5 Lf of tetanus anatoxin and 12 international optical units of pertussis vaccine. Single shots without reimmunization, and standardization of vaccines, were pursued in the 1970s as well. Adherence to WHO requirements has been achieved, and incidence of the three diseases has steadily decreased according to the statistics presented. Figures 3.

[2094-12131/5915]

UDC 616.98:579.842.23]-022.3:63

### FARM ANIMALS AS SOURCE OF YERSINIOSIS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 4,  
Apr 85 (manuscript received 14 Mar 84) pp 77-80

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[Abstract] After the epidemic of *Yersinia enterocolitica* among chinchillas in 1962, interest in the pathogen in domestic and wild animals has grown. Since, however, information is still scant for many species, the authors studied the role of farm animals as sources of yersiniosis in humans and as possible carriers. A method of linear agglutination developed by I. S. Patterson and R. Cook and modified by G. V. Yushchenko and V. I. Dunayev was used to study



the disease in cattle, sheep and goats, and swine. Samples from mucous membranes, blood and meat and excrement were analyzed. Of 83 samples taken from cattle, 8 strains of *Y. enterocolitica* were identified, while from sheep 6 cases were found; another 6 cases were identified from swine excrement samples. The clinical course of the disease was like that of dysentery. Study of 252 workers at a meat packing plant showed that as many as 42.5% had antibodies of strain 09, while 39.7% had antibodies of strain 03 and 24.6% had antibodies of strain 05B. Similarly, 42.9% of the workers at a pork processing plant had 03 antibodies, while lesser incidence of other strains was noted. At a milk plant, 30.9% showed antibodies of 05 and 26%, those of strain 08. Analyses suggested that the likely method of human infection from sheep and swine was by contact, while for cattle it was also alimentary. *Y. enterocolitica* is regarded as an occupational disease. References 10: 2 Russian, 8 Western.  
[2094-12131/5915]

UDC 615.378:579.881.13].03:616-078

TEST OF ERYTHROCYTE ANTIGEN DIAGNOSTIC AGENT FOR DETECTING ANTIBODIES  
TO COXIELLA BURNETTI

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85 (manuscript received 03 Apr 84) pp 51-55

TOKAREVICH, N. K., SHRAMEK, S. and BAYAR, G. A., Scientific Research Institute of Epidemiology and Microbiology imeni L. Pasteur, Leningrad, USSR; Institute of Virology, Slovak Academy of Sciences, Bratislava, Czechoslovakia

[Abstract] Various rickettsiosis diagnostic procedures have been developed in the past 30 years involving passive hemagglutination reaction, but for Q-fever the test has had limited success. The present article reports on development of such a diagnostic procedure and its testing on laboratory models, naturally infected humans and domestic animals. Procedures in the study included determination of the optimum sensitizing dose of lipopolysaccharides (LPS) and preparation of various test and control compounds, and analysis of the retarding effect of passive hemagglutination with a homologous antibody. Negative findings were reported for the serum of laboratory animals not infected with *C. burnetti*, and there were no falsely positive results with unsensitized LPS erythrocytes of sheep and data of passive hemagglutination reaction tests with the homologous pathogen. Antibody dynamics indicate that time of detection, titers and the duration of antibody circulation determined by various tests differ markedly. Combined use of complement fixation and passive hemagglutination tests can increase the effectiveness of serological detection of Q-fever rickettsiosis, and can help in predicting the course of such infections. Figures 3; references 7: 3 Russian, 4 Western.  
[2094-12131/5915]

## DETECTION OF HBsAg IN FAMILIES OF CHILDREN WITH VIRAL HEPATITIS B

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85 (manuscript received 04 Jan 84) pp 48-51

REYZIS, A. R., DRONDINA, A. N., ASRATYAN, A. A., IVANOVA, M. Yu. and  
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Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] While medical parenteral manipulation is a common artificial way for the spread of viral hepatitis B (VHB), it cannot explain all such cases of the disease, and natural spread is also of importance. The present article reports on the incidence of VHB in families of children with confirmed cases of the disease. Over a period of 3 years 142 mothers, 81 fathers and 7 relatives of 162 sick children were studied. Control groups included 39 members of 30 children with HBs-negative VH. Serum studies and countercurrent electrophoresis, precipitation and modifications, and passive hemagglutination reaction tests were conducted. The presence of HBsAg was confirmed in 6.9% of the relatives of children with clinically and laboratory confirmed VHB. A lesser number of medical parenteral involvement was found in HBsAg-positive parents, which suggested domestic infection of the children by chronic carriers of VHB to be a common phenomenon. More studies of a dynamic nature are recommended. Use of passive hemagglutination and countercurrent electrophoresis increased the frequency of detection by a factor of 2.4.

References 11: 5 Russian, 6 Western.

[2094-12131/5915]

UDC 578.891:578.74].083.3

## HBeAg AND ITS ANTIBODIES IN CARRIERS OF HBsAg IN VARIOUS REGIONS OF USSR

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 85 (manuscript received 30 Jan 85) pp 71-74

MIKHAYLOV, M. I., ARAKELOV, S. A., VOROZHBIYEVA, T. Ye., ZHAVORONOK, S. V.,  
ZUBOV, S. V., KOZHUKHAR, A. Ye., KHORVAT, G. N. and ANANYEV, V. A., Institute  
of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Determination of the surface antigen of hepatitis B (HBsAg), which is found throughout the world, was studied in healthy carriers in regions showing various levels of incidence of the disease. Serum of 13,150 donors from the cities of Gorkiy, Vitebsk, Kishinev and Tashkent was studied by precipitation in gel and passive hemagglutination using a diagnostic approach developed at the Gorkiy Institute of Epidemiology and Microbiology, RSFSR Ministry of Health. HBeAg [e-antigen] and anti-HBe were determined in various test systems. Data indicated that regions with high incidence of HBsAg also had higher appearance of concentrations of the antigen that could be identified

with gel precipitation procedures. The frequency of HBsAg appearance among carriers of the disease antigen was in direct relationship to the level of antigen incidence in a given region, while an inverse relationship was noted for HBeAg. While the level of HBsAg in Gorkiy, Kishinev and Tashkent was 1.4%, 5.0% and 9.0%, respectively, the corresponding figures for HBeAg were 5.5%, 12.3% and 13.3%. Figure 1; references 7: 1 Russian, 6 Western.  
[2097-12131/5915]

## INFECTIOUS INTESTINAL DISEASES IN UZBEKISTAN

Tashkent OQITUVCHILAR GAZETASI in Uzbek 10 Aug 85

[Editorial Report]

[Abstract] This abstract is an English language summary of the newspaper source which carries on p 4 a 1,000 word article by S. Muhamedov (doctor of Medical Sciences, professor) titled "Prevent Infectious Intestinal Sickness." Muhamedov begins his article, "In the summer season intestinal sicknesses are common in our republic. These sicknesses include typhoid fever and paratyphoid, salmonella, dysentery, and other intestinal sicknesses." Muhamedov mentions swimming in unclean water (especially by children who swallow the water) and unclean fruits and vegetables as two ways in which these diseases are spread. Moreover, in rural areas people who do not have water from pipes sometimes get these sicknesses from water sources. Muhamedov indicates that flies also play an important role in spreading certain diseases. Some people get sick from eating with dirty hands or eating food which has been left out for hours.

Muhamedov emphasizes the importance of prompt medical care and hospital treatment. Unfortunately, some parents do not seek a doctor's help when their children become ill because they expect the illness will pass on its own. The author advises how to avoid infectious intestinal illnesses in such ways as washing hands, boiling water, swimming only in safe water, and keeping garbage away from water sources. He also specifically mentions the need for cleanliness in kindergartens, nurseries, and summer camps, and fly control.

/5915

CSO: 1840/112-E

UDC 616.98:578.833.29]-06:616.61-008.6-036.2

SOME CHARACTERISTICS OF EPIZOOTIC PROCESS IN HEMORRHAGIC FEVER WITH  
RENAL SYNDROME

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 85  
(manuscript received 12 Nov 84) pp 463-468

BASHKIRTSEV, V. N., RYLTSEVA, Ye. V., TKACHENKO, Ye. A. and STEPANENKO, A. G.,  
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Sciences, Moscow; Republic Sanitary Epidemiological Station, Bashkir ASSR,  
Ufa

[Abstract] Wild rodents caught on natural foci of hemorrhagic fever with renal syndrome (HFRS) in Ufa were analyzed for the presence of specific antigen of HFRS virus, for antibodies to this pathogenic agent and for native HFRS virus. This is the first study in which a specific relationship was shown between the infection rate of bank voles with HFRS virus and the levels of circulating antigen and antibody to this virus. The immunity of test animals differed with age: older animals had higher immunity. In contrast, the younger animals showed more frequent presence of live virus. When selecting various age groups for isolation of viruses, the younger ones should be taken which have not manifested antibodies to the HFRS virus, i.e., when humoral immunity had not formed as yet. References 6: 2 Russian, 4 Western (1 by Russian authors). [022-7813/5915]



NO REPORTS OF AIDS CASES IN USSR

Moscow SOVETSKAYA ROSSIYA in Russian 13 Oct 85 p 5

[Editorial Report]

[Abstract] This abstract is an English-language summary of the newspaper source which carries a 1600-word dispatch (by Aleksandr Lyuty) datelined Washington and entitled "Two Faces of the Epidemic AIDS: Background to the Sensation." The item, pegged to Rock Hudson's death, traces the origins, spread, and effects of AIDS in the United States. Without a single mention of homosexuality, Lyuty states that "Data show that the overwhelming majority of victims are men who are not too selective in their intimate relationships, as well as drug addicts using infected needles to inject drugs."

His dispatch is followed by a 300-word "Scientist's Opinion" by Professor A. I. Vorobyev, head of the Hematology Department at the Order of Lenin Central Institute for Advanced Training of Physicians and Corresponding Member of the USSR Academy of Medical Sciences. He speaks briefly about the various "rumors" concerning the spread of the disease, claims that in order to prevent infection through blood transfusion "it is necessary (apart from anything else) to introduce widely the principle of 'one patient--one donor'," and concludes by saying "with total responsibility":

"Our country has not registered a single case of this disease with the epidemiological features described by the Americans.

"We are prepared to cooperate with scientists from the United States and other countries to combat this disease."

/5915

CSO: 1840/098-F

AIDS-FREE USSR MONITORING POTENTIAL OUTBREAK THERE

Moscow TRUD in Russian 6 Oct 85 p 4

[Abstract] The article consists of a report on the disease of acquired immune deficiency syndrome from the newspaper's correspondent in the USA, and of comments on the disease by two public health officials.\* The report from the U.S. correspondent relates briefly some clinical facts about the nature of the disease, as well as some information on its incidence in the USA and on efforts of medical researchers to find a way of fighting it. A commentary by Prof. Rakhim Musayevich Khaitov, deputy director of the Institute of Immunology of the USSR Ministry of Health, cites World Health Organization data about AIDS and its incidence around the world, and relates in summary what is known about the virus. Also recorded are comments of Petr Nikolayevich Burgasov, member of the USSR Academy of Medical Sciences, USSR deputy minister of health and chief state sanitary physician, who stated:

"AIDS is a dangerous disease; it must not be underestimated. No cases of this disease have been recorded in our country. The whole matter here is that the problem is largely a social one, since it is associated with sexual licentiousness, which unfortunately is tolerated in certain circles in the West, but this is contrary to the nature of our society.

"Nevertheless, we are attentively studying all aspects of the new disease; after all, we do not live in isolation from the world. Taking part in the general struggle of medical personnel against this exceptionally serious ailment, we are ready to cooperate with specialists of other countries."

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\*See also the Daily SNAP, August 7, 1985, p. 1, col. 1.

FTD/SNAP  
/5915  
CSO: 1840/111

ANTIBIOTIC PROPERTIES OF BIFIDOBACTERIA

Moscow MOLOCHNAYA PROMYSHLENNOST in Russian No 8, Aug 85 pp 36-38

SUNDUKOVA, M. B., SEMENIKHINA, V. F., GANINA, V. I., POSPELOVA\*, V. V., RAKHIMOVA\*, N. G. and KHALENEVA, M. P., All-Union Scientific Research Institute of the Dairy Industry; \*Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G. N. Gabrichevskiy

[Abstract] The spectrum of antibiotic activity of *Bifidobacterium adolescentis* MS-42, recently isolated from the GI-tract of a nursing infant [Semenikhina, VF, and Sundukova, MB., *Molochnaya Promyshlennost*, No 3: 33-34, 1980], was tested to determine the potential use of this bifidobacterium in the production of dairy products. Growth inhibition studies on Petri dishes showed that *B. adolescentis* MS-2 yielded inhibition zones of 26-28 mm on streak plates with *Shigella flexneri*, *Sh. sonnei*, *Staphylococcus aureus* 209-p, *Proteus vulgaris*, and *Proteus mirabilis*. The antibiotic effects were confirmed with tube-dilution studies, which also encompassed *Escherichia coli*. In general, *B. adolescentis* was shown to exhibit greater antibiotic activity than *B. bifidum*, which is commonly used for enrichment of various dairy products. In view of this, dietetic and therapeutic dairy products have been devised which contain *B. adolescentis* MS-2. Bifilin (TU-49-997-83), for example, is recommended for nutrition of nursing children less than a year old, while Dairy-Apple Bifidin (TU 49-1029-83) is intended for general use as an agent normalizing the intestinal microflora. Figures 1; references 5 (Russian). [007-12172/5915]

## GENETICS

UDC 579.841.11:579.252.5]:579.61

### EFFECT OF PLASMIDS ON VIRULENCE OF PSEUDOMONAS AERUGINOSA STRAINS IN MOUSE EXPERIMENTS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 85 (manuscript received 27 Jan 85) pp 19-22

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[Abstract] Plasmids are considered to be medically resistant, yet many do not have such ability, but have other properties. Clinical isolates of *P. aeruginosa* are broadly distributed, but data concerning them are scarce. The present article reports on the effect of plasmids on the virulence of *P. aeruginosa* PAO strain obtained from Australia and the USA, as well as Soviet strains. Antigen characteristics of *P. aeruginosa* strains were studied in agglutination reaction on glass with the aid of poly- or monovalent agglutinating O-serums of 20 different types obtained from Hungary. Then the virulence of 21 strains was studied on 2150 white mice. Test results showed that the plasmids in PAO strains reduced the virulence of the pathogen. The plasmids that reduce virulence were from various groups of incompatibility and coded various medical resistant determinants with various effects on the growth of *P. aeruginosa*. Mutations of *rpm* that stabilized  $RP^4$  support in PAO cells also reduced virulence significantly. Chromosome *rpm* mutations caused changes in cell surfaces of *P. aeruginosa*. References 7: 5 Russian, 2 Western.  
[2097-12131/5915]

## HUMAN FACTORS

### ORGANIZATION OF MENTAL HEALTH SERVICES AT INDUSTRIAL ENTERPRISES

Yerevan PROMYSHLENNOST ARMENII in Russian No 6, Jun 85 pp 61-63

OGANYAN, G. Z., Psychologist

[Abstract] A cursory survey is presented of the organization of mental health services in occupational settings, indicating that such services should encompass a mental relaxation office, an office for psychological consultation and psychotherapy, and radio-equipped rest areas for implementing mental relaxation and functional music. The basic function of a mental health service is to provide opportunities for mental relaxation, autogenic training, elimination of mental and physical fatigue, prevention of psychosomatic diseases, prevention of bad health habits (smoking, drinking, etc.), and to improve attitudes toward work and other responsibilities. A detailed program of mental relaxation should consist of five stages, the first of which consists of assuming a convenient or comfortable body posture and listening to relaxing music. The second stage (3 min) represents autumn via a series of appropriate slides that engender relaxation and peacefulness. The third stage (5 min) uses slides and appropriate music to represent the winter scene and induce a semisomnolent state. The fourth stage (5 min) uses a combination of slides and music to represent spring and induce a feeling of energy and rejuvenation, while the fifth stage (3 min) has summer as its theme to induce arousal and desire for activity. The session ends with rousing music and illumination. It is to be understood that negative consequences may follow if the program is administered by inexperienced personnel.

[058-12172/5915]



## IMMUNOLOGY

### ARTIFICIAL VACCINES AND STIMULATION OF IMMUNITY

Moscow MOSCOW NEWS in English No 33, 25 Aug-1 Sep 85, p 10

[Article by Valentina Samoilova]

[Text] There are still many diseases against which it has not been possible to create an immunity. They include the flu, malaria, some venereal diseases, staphylococcal infections causing complications in surgical operations, and others. Below, Academician Rem Petrov, Director of the Institute of Immunology, tells why this happens and how it is possible to "switch on" the organism's protective system against such diseases with the help of artificial vaccines.

All types of flu viruses have some common proteins and polysaccharides, against which an immunity must be produced. In some of these cases an immunity is generated, and in other cases it is not. It means that the reason here lies not in the fact that the microbe changes its countenance, but in the organism's inability to protect itself against the enemy. These general arguments are borne out by the existence of special genes of immunological response, which give the organism the command to repulse the attack of the intruders. Those whose genes ensure a powerful and swift mobilization of the protective forces against a definite infection will not get sick. And vice versa. Therefore, no matter what sophisticated natural vaccines against unvanquished infections may be created, if injected into an organism possessing weak genes of immunological response, they will not produce an effective immunity. This, I believe, is what explains the failures to create vaccines against the flu.

The whole point is in the organism itself and not in the method of treating the virus. But what is to be done if the organism's reaction to the pathogenic agent is weak? It must be made to react strongly. This is the principle which was advanced by our scientific community a few years ago. It served as the basis for producing fundamentally new artificial vaccines. This is the key question of all our theoretical propositions. If we were able to put our plans into effect, it would then be possible to produce an effective vaccine against any disease.

Together with V. Kabanov, corresponding member of the USSR Academy of Sciences, and Professor R. Khaitov we took to looking for substances which could stimulate the organism's protective system, bypassing the "gene" patrol. We found such substances in some unsuitable polymeric molecules--polyelectrolytes.

This was a decisive step on the way towards creating new artificial vaccines. Further, it was necessary to join an alien substance--an antigen secreted from the microbe or a synthesized one--to the polymeric carrier. Research on the cells has demonstrated that such antigen-carrying polymer molecules "include" only those lymphocytes which can produce antibodies against the alien substance planted on the carrier. The billions of lymphocytes permanently circulating in the organism may be likened to a huge army made up of a multitude of divisions and regiments. Each such unit (clone) responds only to a definite antigen.

The advantage of artificial vaccine preparations also consists in the fact that their production requires not the entire microbe but only its active part--the antigen, which must give rise to immunity. On the other hand, the usual vaccine, consisting of tens and hundreds of different antigens, makes the immune system work with great overstrain, considering that antibodies are produced against each antigen, 90 per cent of which are not dangerous.

The injection of the artificial vaccines, which we have created, into animals has yielded promising results. Experiments were set up to test the effects of ordinary and new vaccines for preventing typhus in mice. The usual vaccine, obtained by the traditional method, turned out to be very weak. At best, it protected only half of the experimental mice. Not so with the new vaccine. Its injection into animals made it possible to save all of them from the disease. Moreover, the dose of the antigen was from 50 to 100 times less than in the usual vaccine.

At present, attempts are being made to produce a vaccine against the flu virus. The virus has three main and most thoroughly studied antigens. Two of them are proteins positioned on the surface of the virus particle. The third is hidden in the membrane of the virus. It has always been considered that it is the least suitable for the creation of vaccines. But it was this one, planted on the polymeric molecule, which ensured not only a strong generation of antibodies, but also protected the animals after they had been infected with the virus. Of course, this was not yet a vaccine, but in the not too distant future we intend to test this preparation on human beings. It will be possible to carry this out only when we are able to produce such a polymeric carrier which would be absolutely harmless for man.

/5915

CSO: 1840/060-E

## ARTIFICIAL ANTIGENS, VACCINES REVIEWED

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 85 pp 106-111

[Article by V. V. Pokrovskiy, USSR Ministry of Health Central Scientific-Research Institute of Epidemiology, Moscow: "From Artificial Antigens to Artificial Vaccines"]

[Excerpts] A promising new direction in constructing vaccine preparations and bacterial and viral diagnosticums with unique specificity is the chemical synthesis of molecular structures with the desired immunobiological characteristics of antigens to agents of infectious diseases in humans and animals (18, 34, 41).

In this review we are examining only those artificial antigens which have a direct relationship to the agents of infectious diseases.

The first experiments in obtaining completely artificial antigens were carried out in the late 1970s. N. K. Kochetkov et al. (1, 9, 13-16), using the method of radical copolymerization of artificial antigen determinants of the O-polysaccharide chain of salmonella with acrylamide in water, obtained artificial antigens which imitate O-factors 3, 4, and 9, and are serum-specific for the most widespread groups of salmonella E, B, and D. The immunobiological properties of these antigens were studied in the USSR Ministry of Health Central Scientific-Research Institute of Epidemiology. A number of interesting characteristics of the new type of artificial antigens were brought to light.

Despite the fact that in artificial antigens the determinants are arranged not in the form of chains of sugars, as in nature's prototype, but in the form of offshoots from a polyacrylamide chain, these antigens possessed the serological and immunogenic activity of the prototypes. The serological activity of the artificial antigen in a number of reactions turned out to be higher than the natural analog. Apparently the reason for this is both the high concentration of the determinant and the more advantageous spatial arrangement. The most narrow possible specificity of serological reactions was achieved using artificial antigens. Whereas natural polysaccharide antigens contained structures encountered in different serum groups of salmonella, for example O-factors 1 and 12, the serological activity of artificial antigens was strictly group-specific. These unique properties of completely artificial antigens were used in creating highly specific diagnostic systems for immunoenzyme analysis which are currently undergoing clinical approval.

The artificial antigens obtained by N. K. Kochetkov et al. had the ability to activate specific immunity without using adjuvant, as well as protective activity which keeps animals from becoming infected with virulent strains of salmonella.

It is also very probable that completely different artificial antigens will be used for vaccination and diagnostics. These might be the identical determinants but combined with different carriers. Even for differing diagnostic agents, their own carriers are necessary. It is interesting that the completely artificial antigens studied in the USSR Ministry of Health Central Scientific-Research Institute of Epidemiology turned out to be of little advantage in their earliest form for producing erythrocyte diagnosticums and were modified in the USSR Academy of Sciences Institute of Organic Chemistry especially for this purpose.

But while in creating diagnosticums a very wide choice is possible for the carrier of antigen determinants, in obtaining vaccine preparations the choice of carrier must be extremely thorough, since the use of different carriers can change not only the intensity but even the very nature of immunizer action. In creating vaccines, important requirements are placed on the carrier, such as lack of toxicity, carcinogenic nature, ability to provoke allergic reaction, and so forth. For example, polyacrylamide, chosen as the carrier in the USSR Academy of Sciences Institute of Organic Chemistry, was nontoxic for mice and had a nonspecific immunostimulating and even protective effect which heightened the action of the specific artificial determinants (13, 14).

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CSO: 1840/2098

OBTAINING HYBRIDOMAS THAT SYNTHESIZE MONOCLONAL ANTIBODIES TO POLYSACCHARIDE OF GROUP A STREPTOCOCCUS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 85 (manuscript received 05 Feb 85) pp 35-39

PYTYEVA, Ye. Yu. and DROBYSHEVSKAYA, E. I., Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences

[Abstract] Previous studies of polysaccharides of Group A streptococcus have identified N-acetylglucosamine with a beta-bond and another determinant found in various groups. Monoclonal antibodies (MCA) have been important to define structure. The present article reports on production of MCA for A-polysaccharides (A-PS) using group A streptococcus as the immune agent, and treating the resulting culture with pepsin. Details of cell line identification, screening and storage of clones and production of ascites are summarized. Mice subsequently immunized with the compounds had the lowest titers for A-PS and for the vaccine with lower doses, and the highest with doses of 50 mcg/mouse. Analysis of experiments on determining optimum conditions for forming hybrids of spleen and myeloma cells of mice. Screening was done with pepsin-treated vaccines of group A streptococcus and A-PS. Results showed that 3 of the monoclonal antibodies had precipitating properties. Hybrid formation depended on the presence of immune splenocytes, rather than on ratios of myeloma cells and lymphocytes. The highest yield of hybrids came with growth of cells in 80-100% of alveoli. References 12: 1 Russian, 11 Western.  
[2097-12131/5915]

## RELATIONSHIP BETWEEN METHODS OF PREPARING BRUCELLA LIPOPOLYSACCHARIDES AND THEIR EFFECTS ON HEMATOPOESIS IN MICE

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 85 (manuscript received 05 Feb 85) pp 95-99

MALIKOV, V. Ye., SANIN, A. V. and NIKOLAYEVA, T. N., Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Recent research has shown the bond between the structure of endotoxin and its biological activity. The present article reports on comparative study of the determining features of the structure of lipopolysaccharides (LPS) of brucella obtained in various ways, and various parameters of blood production in mice. Male mice of the SVA and S57VL/6 lines weighing 20-23g., were administered purified LPS preparations containing no nucleic acids, and no more than 3.5-5% protein. In studying endocolonization, the mice were irradiated with sublethal doses, then killed either 5 or 9 days later, depending on whether transitional or KOEc colonies were to be studied. Results indicated considerable variations in the impact of various brucella strains on hematopoiesis: with *B. melitensis* strain 565, blood production was affected greatly, while with *B. abortus* 19-BA, less impact was observed. None of the tested LPS preparations had the ability to stimulate formation of transitory endogen colonies in the spleens of mice subjected to sub-lethal radiation. Injection of lipid A in doses of 0.1-10 mcg did not result in increased proliferation of KOEc, or give protection from radiation. Figures 3; references 23: 2 Russian, 21 Western. [2097-12131/5915]

## FAB-FRAGMENT OF HETEROLOGIC IMMUNOGLOBULIN FOR FLU PROPHYLAXIS AND TREATMENT

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 4, Apr 84 (manuscript received 05 Jul 84) pp 114-115

DEGTYARENKO, V. I., ZEYAKOV, V. F., MAKSIMENKO, I. M. and DIVOCHA, V. A., Odessa City Infection Clinical Hospital

[Abstract] Experience has shown that inoculation alone cannot effectively deal with the problem of influenza due to objective difficulties and the variety of specific forms of the disease. The present article reports on study of enzyme breakdown of heterologic immunoglobulin, particularly the bivalent Fab-fragment of antibodies, which were studied for prophylactic and treatment effects. A Rivanol-alcohol method was used to separate the anti-influenza immunoglobulin. After immunization, hyperimmune anti-influenza serum was obtained from calves and subjected to enzyme hydrolysis. Then its effectiveness in neutralizing viruses was assessed. Results indicated that fundamentally new preparations can and should be studied for serum prophylaxis and serotherapy based on the Fab-fragment. Such studies should include the latest chemical methods for reducing anaphylactic effects. [2094-12131/5915]

## DESCRIPTION OF PREPARATION OF CAPSULAR ANTIGEN ISOLATED FROM YERSINIA PESTIS STRAIN EV

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85 (manuscript received 22 Dec 83) pp 19-23

VEYNBLAT, V. I., TITENKO, M. M., VERENKOV, M. S., MENSHOV, P. I.,  
KORMILITSYN, A. V., MOZHAROV, O. T., SHCHERBAKOV, A. A., VASENIN, A. S. and  
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[Abstract] The capsule antigen (FI) is known to play an important role in the virulence of *Y. pestis* and thus is a leading component of anti-plague vaccine. The present article describes that antigen obtained under mild conditions from hydrolysates of animal protein cultivated at 37°C for 38-46 hours. The bacterial mass was separated with a centrifuge, then distilled and subjected to dialysis to obtain test materials for passive hemagglutination. Amino acids, sugars, proteins, nucleic acids, polysaccharides and nitrogen were then measured, along with the immunochemical activity of FI in comparison to other antisera. Results indicated that the physicochemical and immunochemical homogeneity and activity of the preparation, along with viscosity, molecular weight, sedimentation and the isoelectric point, were distinct from those of previously known FIA and FIB capsule antigens. The capsule antigen was pure protein and not a glucoproteide. References 17: 11 Russian, 6 Western.

[2094-12131/5915]

## STUDY OF CELL-WALL ANTIGEN DETERMINANTS IN RIBOSOMAL PREPARATIONS OF GROUP A STREPTOCOCCUS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85 (manuscript received 26 Jul 84) pp 15-19

SHIKHMAN, A. R., NIKOLAYEV, L. V., KONDRAKOVA, O. A., DZANTIYEV, B. B.,  
BLINNIKOVA, Ye. I., DMITRIYEVA, N. F., SAVELYEV, Ye. P. and PETROV, G. I.,  
First Moscow Medical Institute imeni I. M. Sechanov; Institute of Biochemistry  
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[Abstract] Ribosomal vaccines offer maximum immunity and minimum secondary reactions. The high activity of prokaryotic ribosomes in inducing anti-infection immunity has been shown, but precise mechanisms remain unknown. The present article reports on study of group A29, M-type, streptococcus ribosomes collected in a late logarithmic stage of growth, and washed with a tris-HCl buffer at pH 7.4 containing 0.01M MgCl<sub>2</sub> and, in variant tests, NH<sub>4</sub>Cl. Formation of antibodies to M-protein, lipoteichoic acid and A-polysaccharides was studied. Double immunodiffusion by the Ouchterlony method using "Difco"

US Noble agar cultures, and immuno-enzyme analysis, were included among the tests. Results indicated that immunization of animals with ribosomes of group A29, M-type streptococcus caused development of antibodies to A-polysaccharides and lipoteichoic acid, perhaps due to the presence of M-proteins or to general antigen determinants in ribosome protein and the M-protein cellular walls. The test serum contained more antigens than commercial serum. An immuno-enzyme method for quantitative determination of ribosomes in group A streptococcus was developed. Figures 3; references 9: 3 Russian, 6 Western.  
[2094-12131/5915]



## MARINE MAMMALS

### DOLPHIN COMMUNICATION SYSTEMS

Moscow TRUD in Russian 11 Oct 85 p 4

[Article by Nekrasov, I.]

[Excerpt] Initial results of studies of the behavior of beluga dolphins in the wild, which the marine bioacoustics laboratory of the USSR Academy of Sciences' Institute of Oceanology imeni Shirshov is conducting, have shown that these dolphins have a complex signaling system.

Associates of the marine bioacoustics laboratory studied the behavior of dolphins in the estuary of the Amur River while the dolphins were hunting salmon on their way to spawn. After installing powerful hydrophones in the water to record sounds, scientists on the shore observed dolphins surrounding a school of fish and driving it to a place convenient for catching the fish. The results proved most interesting: the dolphins carried on 'dialogues' while hunting!

It was decided to begin the investigation by interpreting sounds which the dolphins made while hunting individually, without dialogues. Under the direction of Doctor of Biological Sciences V. Belkovich, head of the laboratory, M. Shchekotov, a graduate student, studied tape recordings obtained during a study of dolphins in the White Sea. Shchekotov carefully analyzed more than 3,000 situations of dolphins hunting alone and concluded that all of these situations followed a regular pattern.

When a hunt was in progress, three or four dolphins spread out in the estuary. Each one emitted a booming sound which has been tentatively called a 'slap of the tail.' The purpose of this sound was to frighten and disorient the fish. At the same time, the animal sent out a series of echo-sounding signals which covered territory within a radius of 20-150 meters.

One of the hunting dolphins then spotted a fish. The dolphin instantly emitted one or two different signals resembling short screams. They are individual call signs that are characteristic of this dolphin alone.

In 3,000 situations, not a single dolphin ever 'called out' another's call sign. These signals mean: "So-and-so is beginning to hunt; please don't interfere!" In other words, each dolphin calls itself by name.

FTD/SNAP

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CSO: 1840/111

VALUABLE MARINE MAMMALS OF PACIFIC OCEAN

Minsk SELSKAYA GAZETA in Russian 18 Sep 85 p 4

SHUNTOV, V., doctor of biological sciences, laboratory head, Pacific Ocean Scientific Research Institute of Fisheries and Oceanography

[Abstract] As a result of progressive Soviet policy of nature conservation and protection, the population of sea otters and seals in the Soviet Pacific coastline has greatly increased. Special breeding grounds have been established on the basis of sound scientific principles to encourage breeding and study of the animals, as well as their exploitation for human welfare. The policy has been so successful that today the sea otter population stands at 12,000, with the largest colonies surviving at Medny Island. Similar success has been obtained with seals, and their breeding grounds have been expanded, a no mean feat since they tend to limit themselves to the areas where they have been born. In addition to their furs, medicinal preparations have been derived from their internal organs, the premier example of which is tsetokhron [sic], an effective cardiovascular agent extracted from seal hearts and liver. [057-12172/5915]

## MEDICINE

### HYPOXIA PROPHYLAXIS AGAINST RADIATION INJURY

Moscow MOSCOW NEWS in English No 32, 18-25 Aug 85, p 10

[Article by Yuri Samoilov, Correspondent]

[Text] Oxygen-poor mountainous air has long been observed to have a salubrious effect on the human organism. Very few, however, would risk climbing high above the clouds for a breath of it. There are not too many hospitals for climatic treatment in the mountains to speak of, either. Soviet specialists have worked out a method which enables patients to breathe mountainous air in a conventional clinic. It is now possible not only to treat various diseases with a minimum of expenditure, but also to reduce side effects resulting from radiotherapy treatment of malignant tumors.

Our correspondent Yuri Samoilov met Rostislav Strelkov, D. Sc. (Medicine), author of this method, and professor of the department of molecular pharmacology and radiobiology at Moscow's 2nd State Medical Institute named after N. Pirogov. Doctor Strelkov was asked to answer some questions.

Scientists have been looking for ways to protect the living from the lethal influence of ionizing radiation since the discovery of radioactivity. Preparations for shielding radiation have been made both in this country and abroad. How effective have they proved?

More than 30,000 different chemical combinations were tested, but unfortunately none of them were found to be applicable to man due to their high toxicity. It is quite possible to increase the organism's resistance to radiation in a low-oxygen chamber. But these chambers are complicated and expensive. A fairly simple and economic method of protection from ionizing radiation has been developed in the USSR. It requires neither a rarified air chamber nor a special suit. Air similar to that found at the mountain altitudes of 5.3-5.5 thousand meters above the sea level is pumped in through a face mask. Its oxygen content is twice as low as that of normal air on the plain. Similar mixtures have been used in various physiological investigations of both ill and healthy patients for nearly fifty years. This proportion has proven to be the best. The experiments demonstrated that animals survive otherwise lethal doses of radiation after being exported to such a gas mixture.

Why does oxygen-poor air bring about such an effect?

Human and animal bodies consist of about 80 per cent water. Radiation causes it to form compounds which actively enter into reaction with biomolecules of the cells, causing their damage. The lower the oxygen content in the tissues, the fewer such combinations, which means less damage from ionizing radiation. In other words, lower oxygen content results in a greater resistance of healthy normal cells to radiation.

Does it increase in malignant tumors?

On the whole, it does not. Some tumor cells have little oxygen. Its concentration is somewhere at the lowest possible level. This, by the way, accounts for its increased vitality during radiation exposure.

In order to kill tumor cells they need to be exposed to vast doses of radiation. But the problem here is that normal cells surrounding the tumor are also killed during the exposure. Less damage is done to them when this gas mixture is used for breathing. This allows larger doses of radiation to be applied without too much damage to normal cells. Thus, breathing the gas mixture provides for selective shielding from radiation by strengthening the protective properties of normal cells.

Is your method applicable in oncological treatment?

This method has been used in the USSR since 1975 to treat carcinoma of the breast, lung, larynx, bladder, and osteosarcoma. It first began to be employed in the GDR two years ago. The patient begins breathing the gas mixture 5 minutes before radiation. This is enough time for the oxygen concentration in tissues to be reduced to the necessary level. When radiation treatment starts, the patient continues to inhale the gas mixture. Within 30-50 seconds following the radiation treatment and the removal of the face mask, the oxygen concentration in the tissues returns to normal.

What are the results of applying this method in the clinic?

During the treatment of oncological patients the degree of damage done to healthy tissues--beginning with the skin and ending with the tissues surrounding the tumor--is considerably lower. The tumor, too, is reduced more than when no gas mixture is inhaled, since the healthy tissues retain their own defense systems and oppose tumor growth. The successful application of low-oxygen gas mixtures in oncology has prompted its therapeutic use in diseases that have long been treated in the mountains or under high pressure. Among them are cardiac ischemia, postinfarct cardiosclerosis, high blood pressure, disrupted metabolism, allergies, etc. Noteworthy is the research being carried out at the All-Union Research Center for Mother and Child Care under the supervision of Professor Yuri Karash and Alexei Chizhov, D. Sc. (Medicine). Breathing the gas mixture has produced good effects in treating chronic gynaecological diseases.

Much attention has been given lately to the training and treatment while the patient's breath is held.

This method indeed has therapeutic effect on bronchial asthma and in some other instances. No instruments are required. But holding one's breath for a

long time tends to be hard to bear. Besides, oxygen concentration in the tissues, as it has turned out, decreases by only 10 per cent, while breathing a 10 per cent oxygen gas mixture brings it down by 50 per cent, that is five-fold. This allows us to obtain a more explicit therapeutic effect. We recommend a 30-45-day treatment based on breathing the gas mixture daily, each breathing period lasts approximately an hour, 5 minutes of breathing the mixture alternate with 5 minutes of inhaling atmospheric air.

Reduction of the oxygen content can be considered to be a universal way to increase the adaptability potential of the organism, as well as its survivability under extreme conditions.

An accompanying photo is given which shows Strelkov and I. Kiryanov preparing to treat a patient.

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CSO: 1840/110-E



## MORE ON NEW INSTITUTE OF MEDICAL RESUSCITATION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Oct 85 p 4

[Article by Luk'yanova, B., interviewer]

[Excerpt] The recently created Institute of General Resuscitation is called upon to become the scientific center of medical resuscitation services in our country.\* V. Negovski member of the USSR Academy of Medical Sciences and director of the institute, told about the tasks of this new field of medical science.

"What kind of structure does the new institute have?"

"Two main departments--an experimental department and a clinical one. One of Moscow's largest hospitals--The Botkin Hospital, which has 2,500 beds--served for many years as the clinical base of the laboratory from which our institute has been created. The institute's resuscitation ward is receiving patients from Botkin Hospital, and the city's ambulance services bring emergency cases to our resuscitation ward. The creation of our own clinic at the new institute is thus backed up by much experience."

"What kind of future do you foresee for resuscitation science and practice?"

"I think we will eventually find more effective approaches to treating patients whom we are not able to help at the present time. I am sure that resuscitation will include the process of organ transplantation, for example. Surgeons will replace organs that are irreparably damaged, and we shall restore injured persons to full activity. Our researchers are developing methods for preserving the human organism, so that there will be a reserve of time for delivering patients to clinics."

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\*See the Daily SNAP, August 21, 1985, p 2, col 2.

FTD/SNAP

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CSO: 1840/062

## MANY MEDICAL USES FORESEEN FOR ARTIFICIAL SKIN

Moscow TRUD in Russian 25 Sep 85 p 4

[Article by A. Pominov: "Skin from a Test Tube"]

[Text] Scientists of the Biological Physics Institute of the USSR Academy of Sciences have created artificial skin that hardly differs from real skin in its functions.

We have all been familiar with the fantasy of "living" water since childhood. But that is nothing but folklore. Yet here we have a miracle--something fabulous but real in the walls of our institute. Carefully so as not to spill any, tissue culture laboratory director Doctor of Biological Sciences B. Gavriilyuk poured first a turbid-yellow solution and then, from another flask, crystalline collagen (the main protein in connective tissue) into a small flat vessel. And suddenly like a break in the clouds, a window appeared in the opaque liquid. Boris Karpovich placed the vessel in a cabinet, and an hour later I had in my hands a thin fragment of skin--a semi-transparent milky film that took the scientists a little more than 3 years to create.

"Specialists from the burn trauma center at the Surgery Institute imeni Vishnevskiy turned to our laboratory in 1982," B. Gavriilyuk told his story. "They asked for assistance in creating artificial skin. The need for such a material was great: After all, burns larger than the size of a five-kopeck coin not only heal slowly but also leave a scar--an unpleasant memory for one's entire life. But imagine a situation in which an individual has burns over 10 or even 20 percent of his body. Then physicians must cut skin from undamaged portions of the body, stretch it into shape and graft it to the wound. This operation is painful, and it requires a great deal of time and labor. Nonetheless, the possibility of scarring is not precluded.

"At first we experimented with skin from animals. But the human body rejected it. Would artificial materials work? No, they were unable to fulfill the numerous functions of living skin.

"Hundreds of artificial and natural materials passed through our hands. We worked hand in hand with biologists, mathematicians, physicists and chemists.

"After a year of research we were able to develop a method of biological restoration of skin using individual cells. But once again this required

taking small fragments of skin from patients to be grafted onto burns after sitting for some time in nutrient medium. This was a kind of springboard for further research.

"But then we obtained biological skin by artificial means. We carried out our first experiment with it on animals. The results were encouraging: In literally 5-7 days the skin took, which is very fast. And most importantly, no scars remained. Skin covering the burn was clear and normal, exhibiting only a color difference at first."

"Boris Karpovich, the simplicity of the process of obtaining artificial skin is astounding to the layman. All you did was pour two liquids together, and...."

"That is what we were working for. With our method, we can obtain this material even in a rural outpatient clinic. In the future "living water" may become a component of the household medicine chest. Suppose that you suffered burns. You would not need to go to the hospital; you would simply take a glass vial from the medicine chest, pour the contents onto the wound, and it will heal before your eyes. It sounds like science fiction, but we can already hasten healing processes today, though of course to only a small degree."

"Would I be right in suggesting that the new material would also probably help persons receiving serious injuries in an accident?"

"Yes, of course, artificial skin would be irreplaceable in these cases as well. Unfortunately, nature did not endow man with the full measure of a capability for regeneration."

"But what about scratches and small cuts?"

"Are you alluding to a unique kind of biological bandage? Our material may be found useful here as well. We are working on this problem also. Biological dressings are much more effective than gauze dressings. They do not stick to wounds, they do not cause unpleasant sensations, and again, they hasten healing."

"Articles on medical topics always elicit keen interest and understandable impatience. Here again, it would be dangerous to create the illusion that some particular preparation would be available at the pharmacy tomorrow. Therefore the following question naturally arises: When will artificial skin appear in the hospitals?"

"For the moment we are conducting experiments on animals. In the near future we will apparently be able to turn artificial skin over to doctors for testing. And if they give it the go-ahead, we will have to begin its production."

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CSO: 1840/045

## MAGNETOPHORE THERAPY

Moscow MOSCOW NEWS in English No 36, 15-22 Sep 85 p 10

[Article by Igor Mosin]

[Text] Years of research have enabled A. Fefer, a Leningrad scientist, candidate of sciences, to learn how to purposefully affect various substances, combinations, and materials by applying magnetic force to them to produce the most unexpected effects.

For instance researchers at Leningrad's agricultural physics center ran seeds of rye, wheat, cucumbers and some other crops before sowing them through a rubber or "magnetophore-plated" trough.

Having been "radiated" by the magnetic field, the vegetables and cereals took much less time to ripen yielding 20 per cent more than the average crops. Interestingly enough, only part of the seeds need to be magnetically treated. Through mixing with others the magnetized seeds communicate as it were their properties to them. There are other ways of boosting crop yields through magnetic energy, for instance, grains "stuffed with a magnetic field" for use as a fertilizer.

Hydrobiologically magnetophores can be used in fish farming, water purification and prevention of microbiological corrosion.

### Shoes for Hypertensives

New methods of magnetophore treatment have been developed and tested in more than 50 medical establishments in the USSR. Today they are applied in clinics, hospitals and research centers. For example, magnetophores are used to treat radiculitis, hypertension, and insomnia at Moscow's special city neurotic clinic.

Patients complaining of radiculitis are given special magnetic wastebands to wear. Magnetophores are sewn inside their fabric and immediately begin to improve the patient's health. The purposeful application of magnetic power alleviates aches.

Those suffering from high blood pressure, and nervous breakdowns are offered magnetic insoles. Upon touching certain points of a patient's foot they produce a therapeutic effect on the nervous system. After wearing this footgear for two weeks, hypertensives have a lower blood pressure while their insomnia disappears.

Miracle-making magnetophores have been found instrumental in coping with about 80 diseases and disorders. Doctors say the best therapeutic results are achieved if these curative plates are used with other well-known medications. Magnetophores intensify the effect of traditional medicine on the system. It goes without saying that this miracle-maker can be used only if recommended by the doctor.

#### A Wide Range

Magnetophores are made of various organic or mineral substances mixed with powdery magnetic fillers and later magnetized. Scientists have succeeded in concentrating, as it were, an unlimited number of poles with a great magnetic potential into a small area.

Magnetophores are effective not only in organic nature. A very interesting experiment was conducted at a construction organization. An elastic magnetophore was put around a hose pipe and water pumped through it was used to make cement. Its firmness rose by 25 per cent as a result.

Experiments are now underway to achieve a greater firmness of cement stoppings through the application of magnetophores in dentistry.

There are other ways to use magnetophores, too. A magnetic field "stirs up" the growth of a food [sic] fungus at a factory producing lemon acid in Vyborg. The technology is the same but the output went up bringing during a year more than 100,000 rubles' worth of profits. Magnetic fields has helped to improve the quality of print and reduce the amount of paint used at one of Leningrad's printing shops. Magnetophores have also been used to intensify the process of dyeing yarn at the S. M. Kirov spinning mill there.

/5915

CSO: 1840/061-E



US PRODUCTION OF SOVIET MEDICAL INSTRUMENTS

Moscow PRAVDA in Russian 22 Oct 85 morning edition, p 4

[Editorial Report]

[Abstract] This abstract is an English-language summary of the newspaper source which carried--under the heading "Gift of Recovered Vision: Soviet Licenses in United States"--an 800-word dispatch by A. Tolkunov, datelined New York, October. The author extols the achievements of the Moscow Scientific Research Institute for Ophthalmic Microsurgery, noting that it has concluded an agreement with the U.S. Medical Technology Development Company and the New York Amtorg Joint Stock Company under which instruments and equipment developed at the Moscow institute will be produced under license at a new plant at Clearwater, Florida. The author cites the U.S. company director as saying that Soviet ophthalmic microsurgery is 10-15 years ahead of the United States and predicting that the new plant's output in a few years' time will total \$80 million.

/5915

CSO: 1840/098-F

UDC 579.842.14:579.253].08

SEARCH FOR DNA HOST SPECIFICITY SYSTEMS IN SALMONELLA TYPHI

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 4, Apr 85 (manuscript received 18 Nov 83) pp 3-6

PASHENKOV, A. L., NIKOLSKAYA, I. I., NIGMATULLIN, T. G. and DEBOV, S. S.,  
Ufa Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov,  
USSR Ministry of Health; Scientific Research Institute for Medical Enzymology,  
USSR Academy of Medical Sciences, Moscow

[Abstract] This study of host specificity systems and their components--restriction and modification enzymes--takes account of many genetic and evolutionary processes. The Shigella genus and Staphylococcus aureus have previously been studied from this point of view; the present article reports on study of DNA host specificity systems (HSS) in Salmonella typhi, using O- and Vi-bacteriophages from the Ufa institute. These were cloned using equipment produced by "Difco", USA. Reduced effectiveness in phage cultivation was regarded as evidence of a restriction system in a given race. During cloning morphological features such as colony size and form, transparency and the size of negative colony centers and incomplete lysis were recorded. The 11 lines of Vi-phages and 6 lines of O-phages obtained are further classified according to size, transparency and titration potential. Test cross-titration showed DNA HSS in natural hosts and the test phages. The tests showed 10 strains among the titrated lines of S. typhi to have DNA host specificity systems. Figure 1; references 14: 9 Russian, 5 Western.  
[2094-12131/5915]

UDC 578.833.26.083.3.086.2

IMMUNOCHEMICAL AND ELECTRON-MICROSCOPIC ANALYSIS OF HIGH MOLECULAR WEIGHT  
STRUCTURES OF TICK ENCEPHALITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 85  
(manuscript received 9 Apr 84) pp 419-427

LYAPUSTIN, V. N., LISAK, V. M., GRITSUN, T. S., KOROLEV, M. B. and  
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USSR Academy of Medical Sciences, Moscow

[Abstract] Results of immunochemical and electron-microscopic study of high molecular weight structures of tick encephalitis (TE) virus, separated by sedimentational fractionation, have been reported. At least five antigens were

detected in this material: two populations of BS-virions differing by their behavior in the electric field, two non-virionic antigens with different sedimentation properties and MS-virions. The population of BS-virions could be subdivided into two subpopulations by immunoelectrophoresis: one migrating towards the anode and the other--towards the cathode. Immunologically and structurally, these BS-virion subpopulations were identical. The MS virions were similar to BS-virions in morphological parameters but differed from them in sedimentation characteristics and possibly in the degree of diffusion in agar gel. The location of MS-virions on top of the gradient was due to a high lipid content in their surface membrane. The stellate structures which predominate in the upper portion of the gradient are slowly sedimenting high molecular weight non-virion antigens. Figures 4; references 23: 9 Russian (1 by Western authors), 14 Western.  
[022-7813/5915]

UDC 578.833.26:578.53].08

#### EFFECT OF DETERGENTS ON HEMAGGLUTININATING ACTIVITY OF VARIOUS STRAINS OF TICK ENCEPHALITIS VIRUS

Moscow VOPROSY VIROSOLOGII in Russian No 4, Jul-Aug 85  
(manuscript received 9 Oct 84) pp 437-440

OSTROVSKAYA, O. V., VERETA, L. A. and PUKHOVSKAYA, N. M., Khabarovsk  
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[Abstract] Since it had already been shown that sensitivity of various strains of hemagglutinins to the action of detergents could be used as an intraspecies genetic marker, this principle was studied on tick encephalitis (TE) virus strains with different pathogenicity towards white mice. The study supported earlier data on different effects of detergents on hemagglutinating action of various TE virus strains and on the ability to differentiate among them by the sensitivity of their hemagglutination to the action of hyamine 10-X. The highly pathogenic strains exhibited resistance of hemagglutinins towards the detergent, those with weaker peripheral activity were more sensitive to detergents. This new marker could be used to search for highly active strains. References 12: 4 Russian, 8 Western.  
[022-7813/5915]

CHARACTERISTICS OF SUBVIRION COMPONENTS FORMING AFTER TREATMENT OF  
MACHUPO VIRUS WITH NONIONIC DETERGENT

Moscow VOPROSY VIROSOLOGII in Russian No 4, Jul-Aug 85  
(manuscript received 26 Jun 85) pp 457-463

LUKASHEVICH, I. S., LEMESKO, N. N. and GOLUBEV, V. P., Belorussian Scientific  
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[Abstract] Structural organization of RNA and proteins in the virion of Machupo virus has not been adequately investigated. To solve this problem, a common methodology was used: breakdown of the virus purified by isodensity ultracentrifugation in sucrose gradient, with nonionic detergent NP-40 in presence of 1 M KCl and analysis of RNA and proteins contained in subvirionic structures. Two subvirion components were isolated in urografin concentration gradient. The material with a density of 1.25-1.26 contained high molecular wt. RNA with sedimentation characteristics similar to virion RNA isolated from non-destructed virions. At most, two proteins could be identified with MW of 78 and 64 kD (most of the radioactivity was found in the latter protein). This fraction seemed to be the virion nucleocapsid. The second fraction with density 1.10 to 1.12 g/cm<sup>3</sup> contained glycosylated protein with MW 37 kD and appeared to be a surface glycoprotein. Figures 4; references 27: 5 Russian, 22 Western (1 by Russian authors).

[022-7813/5915]

UDC 613.68:613.731

ELECTRIC SLEEP METHOD OF PREVENTING FATIGUE BUILD-UP IN SAILORS ON  
EXTENDED CRUISES

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 5,  
May 85 (manuscript received 4 Jun 84) pp 42-44

[Article by Yu. Stenko, I. I. Varenikov, and V. A. Skrupskiy, Institute for  
Water Transport Hygiene, USSR Ministry of Health, Moscow]

[Text] Fatigue build-up and reduced human resistance to adverse effects are phenomena that may be observed on marine fishing vessels on cruises lasting many months [4, 9, 11, 13]. In such cases the frequency of neurotic disturbances can reach 42 - 61 percent [6], and up to 35 percent of the seamen complain of sleep disturbances [12]. Inasmuch as the sleep period is important for increasing the body's ability to withstand the conditions of extended cruises, the search for, and testing of methods and means of providing normal sleep during the inter-watch rest period on ships, remain vital problems. The purpose of the present work, which includes a consideration of information about the prospective use of electric sleep in preventive medicine [15], is to compare the effectiveness of drugs and the electric sleep method in the correction of sleep disturbances.

We corrected sleep disorders and evaluated the effectiveness of pharmacological agents and electric sleep in persons working on marine fishing vessels who were treated directly in regard to sleep disturbances, by means of a questionnaire and actographic methods.

In order to average the correction results evaluation, we determined mental and physical work capacity as well as the auditory threshold, "discomfort loudness," and reverse adaptation time (RAT). The need to investigate acoustic analyzer functions is due to the presence of an elevated noise background in the vessels' sleeping quarters whose possible effect, observed during rest periods, include difficulties in physiological function restoration [2, 5, 12]. In that connection, the auditory threshold for air conductivity was determined by tonal audiometry in the standard frequencies 125 - 8,000 Hz. In view of the adverse effect noise has on the central nervous system and the CNS's role in acoustic adaptation [3], we also determined RAT following a three-minute exposure to tones of various frequencies (125, 1,000, 4,000 Hz) at a constant superthreshold intensity of 40 db. The possible use of the "discomfort loudness" test for



evaluating cerebral cortex function under chronic stress has been demonstrated in a number of studies [8, 16]. With this purpose in mind, by increasing the level of acoustic pressure to 100 db, we exposed the test subjects to tones of 1,000, 2,000, and 4,000 Hz. The sound intensity in decibels which was unpleasant and caused irritation was taken as the threshold of "discomfort loudness."

Physical work capacity was evaluated by dynamometric measurement of the maximum possible work (in kilogram-meters) accomplished by the hand muscles at a 75 percent load of maximum muscular strength. Mental work capacity (attention span, rate of information processing) was studied with the aid of Landolt's proofreader's chart.

Night sleep actography [14] and the questionnaire we devised with a 18-point evaluation scale (0 points - good sleep, 18 points - sleep with significant disturbances) were used to compare the effectiveness of the methods used for sleep correction.

The pharmacological agents were selected differentially in relation to the form of sleep disturbance as established by the test subjects' subjective evaluations in the questionnaire. For disturbances occurring while falling asleep we used preparations of the benzodiazepine series (Diazepam, Tazepam, Eunocin), sedatives (valerian tincture, Leonurus), and bromides (Bromisoval, camphor bromide). Surface sleep was adjusted by bromides and barbiturates (Barbamyl, phenobarbital), antihistamines (diphenylhydramine HCl, Pipolphen). Benzodiazepines and bromides were used to normalize the awakening period and reduce insomnia. The drugs were taken in accordance with the recommended doses [7, 10].

The electric sleep treatment consisted of 20 one-hour sessions every day after a watch prior to sleep in a relatively quiet room of the ship's infirmary in accordance with the standard method [5]. We used the Elektroson-4 T apparatus.

We examined 55 persons who were divided into three groups: The first (control) group comprised 9 persons without correction of sleep disorders; the second group (25 persons) in which sleep disorders were corrected pharmacologically, and the third group, consisting of 21 persons, was given the electric sleep treatment. Physiological tests were undertaken in the morning before meals, and in order to exclude the effects of night work on sleep quality, we selected persons who had day watches and a permanent time period for nighttime sleep from 00:30 to 07:30. The age of the test subjects was approximately the same. The number of years of fleet experience for persons in the first group was 10, and seven years for the persons of the second and third groups.

The acoustic conditions during sleep for all of the examined persons were not optimal. The noise in the sleeping quarters was higher than the permissible level (45 db A). The noise level in the cabins of the first group reached  $63.8 \pm 1.3$  db A, and  $59.3 \pm 1.0$  and  $58.8 \pm 1.1$  db A in the

cabins of the second and third groups respectively. Asthenoneurotic manifestations and moderate changes in hearing were observed even at the smallest intensities of prolonged noise [5]. In contrast, the microclimate parameters (temperature, humidity, air flow rate) corresponded to healthy standards.

An analysis of the experimental data indicated that by the end of the cruise, the persons in the first group, in which sleep disorders were not corrected, exhibited exacerbated adverse physiological changes and worsened sleep disorders. Moreover, the amount of incomplete sleep increased along with a progressive lowering of mental (by 0.14 bits/sec) and physical (by 18.3 kGm) work capacity, a moderately elevated (by 8 db) tone perception threshold, together with an increased RAT (by 11 seconds) and a lowered "discomfort loudness" threshold (by 9 db) which signified diminished function of the central sections of the acoustic analyzer.

Subjective evaluation of sleep quality in this group of test subjects worsened by seven points by the end of the cruise, and the actographic data indicated that motor activity during sleep and the period required for falling asleep increased by 43 minutes. Sleep became superficial and the maximum period of quiescent sleep intervals decreased by 14 minutes.

The cited test results for the first group are indicative of the need to correct sleep disorders in that group.

According to the subjective evaluation data, sleep quality improved by 3.8 points ( $P < 0.05$ ) in the second group after pharmacological adjustment. The period required for falling asleep was reliably decreased (by 11 minutes), and there was a reliable seven-minute increase in the maximum length of quiescent sleep intervals. At the same time, there was a continued tendency for increased motor activity during sleep. This could be indicative of incomplete sleep normalization. Nevertheless, the direction of physiological changes in the second group was more favorable than in the first group. The second group exhibited a positive tendency to retain stable physical work capacity, and the tonal audiometry data showed that there was a tendency toward a relative improvement in the function of the peripheral section of the acoustic analyzer. The moderate retardation of acoustical adaptation and lowered "discomfort loudness" threshold may be attributed not only to the insufficient efficacy of the hypnotic agents, but to their side effects as well.

In contrast to the second group, the persons in the third group had no complaints and noted a feeling of alertness and freshness. This confirms the advantages of electric sleep therapy. The sleep actographic and subjective evaluation results for the persons of the third group reliably contrasted to those of the first group ( $P < 0.05$ ) and indicated a significant improvement in sleep quality. Sleep in the third group became more tranquil than it was in the second group ( $P < 0.05$ ), and motor activity during sleep was less than the original level.

A comparison of the test results for the seamen before and after electric sleep treatments demonstrates an increase in their physical and mental work capacity (by 11 kGm and 0.17 bits/sec respectively). Despite the acoustic discomfort in the sleeping quarters and the attendant possible cumulative effect of noise [2], the dynamics of audiological changes in the test subjects was observed to be positive. The increase in the "discomfort loudness" threshold to 8 db, the nine-second decrease in RAT, and a seven-decibel improvement in tone perception are apparently due to the favorable changes of restoring acoustic analyzer and CNS function as a whole during sound sleep.

Thus, the improvement we detected in both the quality of sleep and the general functional state of the body following the correction of sleep disorders in extended sea cruises, may be evidence of a cause-and-effect relationship. A comparative analysis of the methods employed to correct sleep disturbances indicates the effectiveness and preferableness of applying electric sleep therapy to prevent fatigue build-up in fleet personnel whose work organizational forms are characteristic for their occupation.

#### Conclusions

1. The maintenance of normal sleep and the correction of sleep disturbances can be included among measures for the prevention of fatigue build-up in special forms of work organization in extended sea cruises.
2. Electric sleep therapy is the preferred and most effective method for preventing the adverse effects resulting from the the overall impact of a ship's environmental factors over a period of many months, including the cumulative effect of noise.

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CSO: 1840/038



UDC 579.834.115+579.842.11:579.253.08

CLONING AND EXPRESSION OF LEPTOSPIRA POMONA HEMOLYSIN GENE IN ESCHERICHIA COLI

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 85 (manuscript received 05 Feb 85) pp 7-10

DAYN, A. A., ROZINOV, M. N., GOLTSMAYER, T. A., GERSHANOVICH, V. N. and  
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Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A promising approach to the study of microorganism pathogens is the cloning of their genes in *E. coli*. The present article reports on study of *L. pomona*, which in severe cases is accompanied by yellow jaundice, and its expression in *E. coli*. Chromosome DNA of *L. pomona* was obtained by a Fisher-Lerman process, DNA phage by phenol extraction and plasmid DNA by alkaline extraction. Cloning involved a gene inventory or bank and subsequent screening, using cosmides or vectors based on the lambda phage. Features of fragmentation and cloning are summarized. The recombinant phage carrying the hemolysine gene was selected from phage vector lambda L47.1, and also in the phoUC19 vector. Secretions of hemolysin in the culture of *E. coli* were not observed. Figures 2; references 21: 1 Russian, 20 Western.  
[2097-12131/5915]

## NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 613.647+612.014.426

### LOCAL EFFECTS OF MAGNETIC FIELDS IN CONTROLLED HUMAN STUDIES

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 7, Jul 85  
(manuscript received 5 Jan 85) pp 33-36

ROSHIN, V. A., Institute of Hygiene imeni F. F. Erisman, Moscow

[Abstract] In view of the increasing human exposure to magnetic fields, controlled studies were conducted with 10 clinically healthy males, 20-39 years old, to determine local effects induced by exposure of the hand, under controlled conditions. Exposure of the hand to a 0.75 or 1 kOe magnetic field for 15 or 30 min led to a 0.5°C temperature drop, while nail capillaroscopy revealed concomitant vasospastic changes. Simultaneously, such exposure also led to an increase in the pain sensitivity threshold ( $P < 0.02$ ) and mild hypotension. The short-term changes were interpreted to reflect effects of the magnetic field on the regulatory function of the autonomic nervous system, and demonstrate the need for careful assessment of such consequences for determination of maximum admissible exposures. References 7 (Russian).  
[054-12172/5915]

UDC 613.647-07

### ASSESSMENT OF SELECTED PHYSIOLOGICAL INDICATORS IN ANTENNA OPERATORS AT SHORT-WAVE TRANSMITTING AND RECEIVING CENTERS

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 7, Jul 85  
(manuscript received 18 Mar 83) pp 36-39

POKHODZEY, L. V., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] A battery of physiological and psychological tests was used to assess the effects of electromagnetic emission on personnel (males, ca. 35-39 years) servicing antenna feeder systems at short-wave transmitting and receiving stations. The workers in question were employed at low (below 100 kW), intermediate (to 250 kW), and high (over 250 kW) wattage stations. Studies conducted for a week demonstrated no general or long-lasting effects on psychological and most physiological parameters, with the different levels of exposure generating a pattern of similar changes differing somewhat in intensity. Deviations from normal that were noted generally subsided by the

end of a working day. However, the visual analyzer presented with functional lability at the end of a day, particularly in workers exposed to the higher intensity fields. Similarly, moderate hypotension persisted in workers exposed to moderate and high intensity fields. In all groups hand strength diminished by 18.6-25.4% at the end of a working week, while the level of reduction in a control--unexposed--group was 10%. The data show that determination of safe levels of electromagnetic exposure requires adjustment for the intensity of radiation. Figures 1; references 3 (Russian).  
[054-12172/5915]

UDC 613.155.3:615.285.7]-07

DETERMINATION OF SANITATION STANDARDS FOR RIZID-II IN WORK ZONE ENVIRONMENTS

Moscow GIGIYENA TRUDA I PROFESSIONALNYE ZABOLEVANIYA in Russian No 6, Jun 85  
(manuscript received 1 Feb 84) pp 52-53

MANENKO, A. K., CHURA, D. A., ZADOROZHNYA, I. SH. KIRIK, L. V.,  
PAVLYUK, Ya. D., KOMISSAROVA, L. A., PAVLIN, A. S., PETRUS, V. S., REBRIN, V.G.  
and MUGAKO, L. V., Medical Institute, Lvov

[Abstract] Rizid-II is a new domestically produced fungicide used to control rice periculariosis. After single application, this agent shows average toxicity ( $LD_{50}$ ) for white mice to be 435 mg/kg, for white rats--530 mg/kg and for guinea pigs--420 mg/kg. Single inhalation exposure resulted in noticeable effects at a dose of 610 mg/m<sup>3</sup>. The threshold of single exposure was set at 24.4 mg/m<sup>3</sup> based on hemolytic changes; the threshold of multiple inhalations effect was set at 5.4 mg/m<sup>3</sup> based on a number of physiological changes. According to the experimental data, Rizid-II belongs to the II or III class, depending on the route of administration and on the end points. No embryotoxic or mutagenic effects were noted. A 0.3 mg/m<sup>3</sup> dose of Rizid-II was recommended as a safe level for the working zone environment, noting "skin" and "allergen" cautions. References: 3 (Russian).  
[039-7813/5915]

UDC 617.7-02:613.632:615.285.7

TOXIC EFFECTS OF RICIDE-II ON VISUAL ORGANS

Moscow GIGIYENA I PROFESSIONALNYE ZABOLEVANIYA in Russian No 3, Mar 85  
(manuscript received 15 Mar 83) pp 50-52

RIZA, L. V., SEMENOVA, G. S. and KORDONETS, I. G., Medical Institute, Lvov

[Abstract] A study was conducted on the effect of the organophosphorus fungicide ricide-II (O,O-diisopropyl-S-benzylthiophosphate) on the visual organs of rabbits. Pure pesticide, as well as the 95% and 50% commercial preparations used in agriculture, were tested. Immediately after instilling ricide-II, conjunctival edema, vasodilation and plethora on the conjunctival and perilimbal vessels and hyperemia of the intermarginal spaces were noted.

Tearing, blepharospasm and corneal erosion developed. The 50% preparation caused less intense effects. The changes in the mucosa began to decrease on the second day after instillation, and normalization was seen in one to two weeks. Ricide-II also caused initially decreased and then elevated ophtalmotonus, lasting 5-8 days, as well as pupillary construction. Corneal sensitivity was decreased, with the 50% preparation giving the greatest effect. Xylene, contained in the 95% and 50% ricide-II preparations and studied separately, caused dilation of conjunctival and iris surface blood vessels, as well as epithelial edema, blepharospasm, decreased intraocular pressure and miosis. Symptoms subsided by the fifth day after instillation. Benzyl alcohol, also a component of the commercial fungicides, produced petechial hemorrhage, pronounced vasodilation and edema with blisters and erosion of the cornea. The data indicate that ricide-II causes first to second degree eye burns and disturbs optical microcirculation. The 95% industrial preparation is more dangerous than the 50% or pure fungicide. References 4 (Russian). [037-12126/5915]



## PHYSIOLOGY

### PRESSURE CHAMBER TESTS OF HUMAN ADAPTATION POTENTIAL

Moscow SOVETSKAYA ROSSIYA in Russian 20 Sep 85 p 3

[Article by V. Kostyukovskiy]

[Text] I sat down on the seat and began to pedal. I wouldn't get far; what I was riding was not a bicycle, but an ergometer bike, and in addition, one installed in a pressure chamber.

After five minutes, I heard the instruction:

"Take a rest period now, and after that we'll increase the amount of exertion."

The pressure chamber at the Scientific Research Institute of Biophysics and Biology at Tomsk State University is a room of a special kind. Temperatures ranging from minus 33 to plus 90 degrees, and pressures corresponding to elevations as high as 15 kilometers can be set inside this chamber. More modest parameters are selected for experiments, to be sure. Subjects (volunteers, usually medical students) undergo tests at a temperature of about 25 degrees inside the chamber. In about 15 minutes, the subjects 'ascend' to 3,500 meters above sea level; next comes 'factor operation time.' Readings of arterial pressure, pulse rate and body temperature are transmitted to instruments by sensors.

Human capabilities and fitness for work in extreme conditions are studied under the direction of Candidate of Medical Sciences T. I. Shustova and Candidate of Biological Sciences Yu. A. Ryabchuk here, in the institute's department of physiology.

"We can state with assurance whether those who have undergone tests in our department should try to work in the north or the south, underground or in the air; in short, what their health potential is," related Ryabchuk. "At present, our program is a complex one and requires much effort, costly equipment and, lastly, time. We have therefore set ourselves the goal of developing tests--physical and mental ones--which are fairly simple and versatile, so that any person who applies to a polyclinic can receive a rating of his body's capabilities in a few minutes. We shall soon have standard methods for such tests ready for medical personnel."

FTD/SNAP

/5915

CSO: 1840/062

UDC 615.27:547.563.4:591.132.2/5

#### EFFECT OF CRESACIN ON PANCREAS EXTRASECRETORY ACTIVITY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 1, Sep 85  
(manuscript received 13 Sep 84) pp 241-244

VORONKOV, M. G., corresponding member USSR Academy of Sciences, BATOYEV, TS.Zh.,  
TSYBEKMITOVA, G. Ts. and SEMENOVA, N. V., Irkutsk Institute of Organic  
Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] Effect of cresacin on extrasecretory pancreatic function was studied in dogs (5) with a u-shape fistula and in chickens (10) with transplantation of the pancreatic duct to another part of the intestine by the Ts. Zh. Batoyev method. Cresacin (doses of 2, 5 or 10 mg/kg of live weight) was added to the animals' food after determining the background level of pancreatic activity without use of the drug and changes in pancreatic activity were recorded. Inclusion of cresacin in the food increased amylase activity and protease activity in the dogs and chickens with the amount of increase depending upon the cresacin dosage. The experiments showed the pronounced stimulation of pancreatic function in the experimental animals after addition of cresacin to their food. The increase in pancreatic function was attributed to the most complete and effective decomposition of nutrients with their subsequent absorption and utilization. Figure 1; references 14 (Russian).  
[008-2791/5915]

UDC 612.821.6

#### IDENTIFIED SYNAPSE: PHYSIOLOGICAL ASSUMPTIONS AND SYSTEM OF IDENTIFICATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 282, No 6, Aug 85  
(manuscript received 26 Nov 84) pp 1508-1512

SOKOLOV, Ye. N. and LOGUNOV, D. B., Moscow State University imeni  
M. V. Lomonosov; Institute of Higher Nervous Activity and Neurophysiology,  
USSR Academy of Sciences, Moscow

[Abstract] A system of synapse identification is proposed, based on the synaptic input of command neurons in the snail *Helix lucorum taurica*. In the approach taken, the multiplicity of synaptic contacts is presented as a matrix array of synaptic connections, such that a binary numerical index represents the synapse of a given presynaptic neuron with a given postsynaptic neuron.

The constructed matrix for synaptic connections leads to tabulations of the properties of identified synapses, filled in with experimental data derived from electrophysiological studies, such as amplitude-time parameters. Connections were demonstrated between selected presynaptic neurons in the left parietal ganglion and selected postsynaptic neurons in the left and right parietal ganglia responsible for avoidance reflex, as well as with selected postsynaptic neurons in the right and left metacerebral ganglia involved in the food reflex. Figures 2; references 11: 9 Russian, 2 Western.  
[010-12172/5915]

UDC 613.644:534.321.8]-07:617.711-005

#### EFFECT OF INFRASOUND ON STATE OF HEMOLYMPHOCIRCULATORY BED OF CONJUNCTIVA

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 6, Jun 85  
pp 51-52

SVIDOVYY, V. I. and KUKLINA, O. I., Sanitary-Hygiene Medical Institute,  
Leningrad

[Abstract] White male rats were exposed to infrasound of 8 Hz frequency, 100 and 140 dB intensity and duration of 5, 10, 15 and 25 days, with 3 hrs daily exposures. Detailed changes, observed in the circulatory system of test animals, are described, showing that these effects intensified with exposure, showing cumulative effect in hemocirculatory channels, perivascular infiltration and in twisting of the capillaries and vessels. Lymphatic system changes were expressed as lymphaggregations and thinning of finely meshed components of the network of lymphatic capillaries as well as by changes in the configuration of lymphatic vessels. These changes were preceded by disorders of trophic processes in the cellular and noncellular component of the conjunctive tissue. The use of infrasound exhausted the adaptive potential of large cell apparatus, resulting in increased permeability of the capillaries and aggregation of formed elements.  
[039-7813/5915]

UDC 613.632:622.323]-07

#### DYNAMICS OF PHYSIOLOGICAL INDICATORS AND EFFECTS OF REST ON FUNCTIONAL RECOVERY IN CONTROL PANEL OPERATORS AT OIL REFINERIES

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 7,  
Jul 85 (manuscript received 19 Feb 85) pp 42-44

ALLAKHVERDIYEV, A. I., Azerbaijan Institute of Labor Hygiene and  
Occupational Diseases imeni M. M. Efendi-zade, Sumgait

[Abstract] The status of the CNS and the cardiovascular system in 68 control panel operators at an oil refinery was assessed in the course of a working day and after various periods (5-20 min) of rest at the end of the shift. CNS effects were evaluated in terms of latent periods of response to light and auditory stimuli, and on the basis of correction tests. The phasic variation

in the efficiency of the CNS was indicated by an initial deterioration of performance, followed by a phase of enhanced performance and, toward the end of the day, followed by further deterioration. Testing after various rest periods showed that complete recovery had not occurred even after 20 min of relaxation. Determination of various hemodynamic parameters (BP, heart rate, minute volume, etc.) demonstrated that the cardiovascular system had recovered from the strain of a day's work in most cases in 5 to 10 min.

References 7 (Russian).

[054-12172/5915]

UDC 616-008.939.15-02:612.766.1

#### EFFECTS OF PHYSICAL WORK CAPACITY ON INDICATORS OF LIPID AND CARBOHYDRATE METABOLISM IN SEDENTARY WORKERS

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 7, Jul 85 (manuscript received 18 Mar 85) pp 56-57

PIKTELITE, O. S., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] A cohort of 39 female assembly workers with high and low physical work capacity profiles was divided into the respective categories and evaluated on the basis of blood chemistries. The subjects ranged in age from 30 to 39 years, with histories of more than 9 years of sedentary work. Analysis of the data demonstrated that the serum levels of total cholesterol, beta-cholesterol, triglycerides and lactate were significantly higher in the group with low work capacity. These observations indicate that individuals with a low capacity for physical work are at increased risk of cardiovascular disease, and the provisions for regular exercise periods should be implemented at the work site and at home. References 25: 15 Russian, 10 Western.

[054-12172/5915]

UDC 612.822.3+612.017.1

#### EFFECTS OF ANTISERA AGAINST ISOENZYMES OF NEUROSPECIFIC ENOLASE (PROTEIN 14-3-2) ON SUPERSLOW BRAIN ACTIVITY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85 (manuscript received 9 Apr 85) pp 1004-1009

BORODKIN, Yu. S., MOSHKOV, K. A., LAPINA, I. A., NIKOLAYEV, Yu. V. and YAICHNIKOV, I. K., Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Studies were conducted on the effects of introduction of antisera designed against isozymes of protein 14-3-2 (brain enolase) on zeta-wave activity. Antisera against the enolase isozymes were raised in rabbits immunized with rat brain enolase, and subsequently injected into the lateral ventricles of experimental rabbits for correlation of isozyme specificity

with electrophysiological manifestations. In the case of frontal neocortical activity the baseline amplitude of 0.6 mv of zeta activity (0.2-0.5 Hz) was depressed to 0.15 mv by antisera against the gamma-gamma-isozyme, with maximum depression seen 70 min after administration. Antisera against the alpha-gamma-isozyme resulted in a maximum elevation to 1.1 mv at 50 min, and mixed antisera against alpha-gamma- and gamma-gamma-isozymes resulted in maximum depression to 0.2 mv in 35 min. In the case of the activities of the dorsal hippocampus and the medial group of nuclei of the optic thalamus the various combinations of antisera elicited an increase in the zeta potential amplitudes. In summary, the data indicated that the gamma-gamma-isozyme of protein 14-3-2 has a unique functional significance in the generation of the zeta waves. Figures 1; references 13: 9 Russian, 4 Western.  
[065-12172/5915]

UDC 616-001.34-057-07:616.74-008:934.959

#### ALTERATIONS IN CREATINE METABOLISM IN VIBRATION SICKNESS

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 9, Sep 85 (manuscript received 16 Oct 83) pp 10-12

ARTAMONOVA, V. G., KLISHOVA, Z. N. and NIKON, I. O., Sanitary Hygiene Medical Institute, Leningrad

[Abstract] Creatine metabolism was studied in 74 patients, 25 to 50 years old with various degrees of vibration sickness, with control data derived from a control group of 25 healthy men. Determinations of 24 h urine levels of creatine and creatinine showed no significant differences in urinary creatine levels between the healthy controls and the 74 patients. However, the mean creatine concentration in the control subjects was 0.052 g/24 h, and 0.349 g/24 h in the patients ( $P < 0.001$ ). The urinary excretion of creatine was higher in stage II patients than in stage I patients. The higher levels of creatinuria in stage II patients was ascribed to the combination of polyneuritis and more advanced muscle tissue damage in the form of myositis and myofascitis. References: 7 (Russian).  
[069-12172/5915]

UDC 616-001.34-057:622]-07:616.152.41-074

#### STATUS OF CALCIUM METABOLISM IN COAL MINERS WITH VIBRATION SICKNESS

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 9, Sep 85 (manuscript received 10 Jul 84) pp 13-16

KOLOMIYETS, V. V., Medical Institute imeni M. Gorky, Donetsk

[Abstract] An analysis was conducted on the status of calcium metabolism in 29-53 year old coal miners with various degrees of vibration sickness for comparison with data derived from 32 healthy control males. Total and ionized serum calcium levels were significantly elevated in 94 coal miners with



vibration sickness, the degree of elevation showing a direct correspondence to the clinical severity of the illness. The tabulated data also showed that renal calcium clearance in the patient group was diminished in comparison with the control subjects, as was the calcium binding capacity of the serum. Urine calcium levels did not show any statistical differences between these two groups. These observations indicate that vibration sickness is accompanied by a profound alteration in calcium homeostasis, due in large measure to enhanced calcium resorption in the kidneys. Figures 1; references 14:

9 Russian, 5 Western.

[062-12172/5915]

## PUBLIC HEALTH

### BRIEF

MICRO EYE SURGERY CENTER --An inter-Oblast micro-eye-surgery center has been created in Ukhta, Komi ASSR. It is the largest such medical establishment in the European North. The 6-story building can cater to more than 2,000 patients yearly. The center will serve the population of the autonomous republic and also miners from Tyumen and the Yamal-Nenets Autonomous Okrug. [Summary] [Moscow Domestic Service in Russian 0500 GMT 17 Oct 85 LD] 5915

CSO: 1840/098-F

## DISEASES IN CEMA COUNTRIES

Moscow NEW TIMES in English No 36 Sep 85, pp 22-23

[Article by Vladimir Petrunya]

[Text] One of the most outstanding achievements of modern medicine is the elimination of diseases that until recently were considered incurable. Medicine is gradually learning to combat the gravest diseases.

Experience has shown that, in conducting a general offensive against common diseases, it is best to pool the efforts of specialists from several countries. Illustrative in this respect is the experience of the CEMA countries where concern for the health of the population is the prime duty of the state.

Practical public health issues included in the socio-economic development plans of the various CEMA countries are increasingly in the focus of attention in their relations with one another. Thus, among the 22 standing CEMA commissions for the advancement of economic ties there is one that might appear to be remote from economic matters, namely, the standing committee on cooperation in health services.

In the current five-year-plan period (1980-85) this commission has been working on 13 large-scale composite problems. They are being tackled by international teams working on the basis of distinct division of labor between the countries concerned. Among these problems are cardiovascular diseases, malignant tumors, scientific elaboration and unification of methods and means of clinical laboratory diagnosis. It is worth noting that every participating country acts as coordinator of the work on one or another composite problem. For instance, Bulgaria coordinates effort in the field of labor hygiene and occupational diseases, Hungary--in research in the standardization of medicines, the G.D.R.--in contagious diseases, and Poland--in maternity and child protection. Czechoslovakia is coordinator of work in transplantation of organs and tissues.

### In the Memory of the Computer

The computer of the Institute of Clinical and Experimental Medicine in Prague stores in its memory detailed information received from different countries on patients who need a kidney transplant. The job of the computer is not only to collect the information, but also to analyze it, to put the patients on the

"waiting list" monitored by doctors in Bulgaria, Hungary, the G.D.R. Poland, Cuba and the Soviet Union. The list is a sort of display of the Intertransplant system, one of the youngest organizations within the CEMA framework.

Intertransplant has to cope with complicated problems that cannot be resolved by individual institutes and even national medical establishments. In the opinion of Professor Vladimir Kocandrle, director of the Institute of Clinical and Experimental Medicine of Czechoslovakia, while extensive international cooperation is expedient in most fields of medicine, in kidney transplant operations it is simply indispensable.

Specialists from the countries participating in Intertransplant have defined the basic areas of research. They include the development of methods of controlling tissue incompatibility, improvement of methods of conserving and transplanting organs, and, finally, development and testing of artificial organs. In the course of discussion and joint research a common technology for operations is worked out. For instance, it is important to standardize the methods for coping with surgical complications. A certain unity has been achieved in methods of therapy as well. Through combined effort, new medical preparations are being developed and tested.

But besides the medical, there are a good many purely organizational problems. Sometimes a kidney has to be transported across several frontiers, and the transplant operation has to be performed within 36 hours. Hence formalities have to be reduced to the minimum and airline motor transport and train connections speedily secured. The participants in Intertransplant have agreed on duty-free import and export of donor kidneys to all of the cooperating countries.

The Institute of Clinical and Experimental Medicine in Prague has been elected chief coordinator of Intertransplant. Its computing center carefully analyzes all the information teletyped to it round the clock. The data received help select the most suitable recipient for each organ acquired. The transplant is promptly delivered by the shortest route to the country and clinical hospital, where the critical patient is being prepared for the operation.

On the first of each month the "waiting list" with all the accumulated information is sent from Prague to all the national coordination centers of the CEMA member countries, and from there to the local medical institutions. If a country has a suitable transplant kidney the national coordination center may ask Prague to select the right recipient (at present several thousands of patients have been entered on the "waiting list" along with all the accompanying information). The computer will take no more than two minutes to provide the answer. Data on the performance of the Intertransplant system is also stored in its memory.

Thus, in 1980-82, the computing center registered 1,421 kidney transplants. As it is an extremely complicated operation there is always an artificial kidney in "stand-by condition." A stationary apparatus will keep the patient alive while he is waiting for a suitable transplant kidney or if the first transplant is rejected.

Of course, mass scale internal organ transplant operations on all who may need them are still far off. This is still a formidable problem, one that can be solved only through joint international effort. This applies not only to kidney transplants. Collective search has been acquiring increasing scope. Surgeons, immunologists, chemists, pharmacologists, biochemists, physiologists and bio-engineers have been improving the methods of clinical transplantation of the liver, bone marrow and pancreas.

#### Common Asset

Intertransplant is not unique as regards organizational structure. In capitalist countries, too, doctors can set up international cooperative associations, though on a totally different basis. Their basis is a commercial one, when the health, and quite often the life of a patient depend on the size of his bank account. Intertransplant functions on socialist principles of concern for man. The countries that have created the system have shouldered all the expenses. These expenses are not low--the cost of treatment of a single case runs to tens of thousands of rubles.

As a result of direct interstate scientific contacts our countries have made considerable headway in prophylaxis of cardiovascular disorders, influenza and many other contagious diseases. They have also scored definite achievements in such an important field as the development of standards for the CEMA member countries in labor hygiene and environmental protection. The plan for cooperation also covers problems bearing on tropical diseases and the creation of health rehabilitation services.

Practical experience has shown that an international research collective is able to solve a complicated problem in half or even one third the time required by a national team. The results of collective research are made available to all the cooperating states. The medical researchers of the CEMA member countries have laid down the guidelines for cooperation for the period ending in 2000. Though the list is rather long, in the final analysis it serves one purpose--the maintenance of the health of every citizen in countries of the socialist community.

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CSO: 1840/059-E



## CONTROL OF HEALTH CARE FOR WOMEN AND CHILDREN IN UZBEKISTAN

Tashkent SOVET OZBEKISTONI in Uzbek 24 Aug 85 p 2

[Editorial Report]

[Abstract] This abstract is an English-language summary of the newspaper source which carries on page 2 a 1,200-word article by T. Khodkhojayev, departmental chief of Uzbek SSR People's Control Committee, entitled "The People's Health Is the Nation's Wealth" in which he reports the results of a PCC [People's Control Committee] investigation of medical services for mothers and children in Kashkadarya, Tashkent and Fergana oblasts, and Tashkent City. This question had already been studied by special PCC commissions in July 1984, and once again numerous shortcomings were found. A substantial number of medical establishments serving children and mothers still lack modern buildings and construction is extremely sluggish. Trusts of the republic Construction Ministry have fulfilled only 57 percent of their plan in this area in the first half of 1985, and the quality of completed work is extremely low. Personnel at some medical establishments perform poorly and irresponsibly. In some cases children taken to dispensaries are not examined by doctors so that cases of rickets, hypertrophy and anemia are not diagnosed in time. Numerous pediatricians lack sufficient knowledge about the treatment and diet requirements of children. At some clinics in Kashkadarya two or three doctors examine patients in the same room. Examinations and medical assistance, for children under 1-year old and women in the first term of pregnancy, are unsatisfactory. The supply and use of drugs such as saline solution and hormones leave much to be desired at some medical establishments. Various medical workers fail to carry out treatments prescribed by doctors for patients until several days later. A number of women's consultation offices lack scales, thermometers, and other necessary instruments. There are also serious deficiencies in food services for patients. Food is prepared poorly and fruits and vegetables are rare. At most children's hospitals food is not prepared for children under 1-year old and their mothers are required to do this. There are also cases of apathy and indifference on the part of doctors. All these shortcomings are taking place because leaders of health organs and medical establishments are not paying serious attention to providing adequate health care to mothers and children. People's control organs must establish control over this problem and take appropriate steps against guilty parties.

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CSO: 1840/112-E

ACCIDENTAL DRUG POISONING IN UZBEKISTAN

Tashkent GULISTON in Uzbek No 2, Feb 1985, p 27

[Editorial Report]

[Abstract] This abstract is an English-language summary of a 500 word article by Yu. N. Ostapenko (toxicologist) titled "One Must Know [Proper] Norms." The article is a warning about accidental drug poisoning by people who take medicines without a doctor's supervision. Sometimes children take medicines which are left in their reach. Other times patients ignore correct doses. This has been the case, for example, with recently developed medicines for circulatory disorders, with medicines to reduce temperature, and to prevent colds. Harmful drugs to prevent pregnancy sometimes cause such consequences as sharp intestinal pains and a fast heartbeat. The article advises keeping medicines out of the reach and sight of children and persons with nervous disorders, and taking them only in doses recommended by doctors. Those with accidental poisoning should be treated in hospitals. In many cities special toxicological units have been established.

/5915

CSO: 1840/112-E

## SHORTCOMINGS IN HEPATITIS PREVENTION AMONG CHILDREN

Tashkent OQITUVCHILAR GAZETASI in Uzbek 7 Aug 85, p. 1.

[Excerpt] At a meeting of the Borad of the Uzbekistan SSR Ministry of Education there was a discussion of the question of the work by the units of people's education and health of Fergana and Namangan Oblasts and of the Karakalpak ASSR being carried out to prevent children from becoming ill with viral hepatitis. It was noted that the measures developed by the republic Ministries of Education and Health on prevention of the spread of viral hepatitis were not being carried out. There are serious shortcomings in the organization of providing necessary prophylactic help in preschool education institutions and schools.

In the resolution adopted by the board, a number of measures are planned to improve the situation in this area.

/5915

CSO: 1840/112-E

#### MEDICAL EMERGENCY CALL--CASE STUDY IN IRRESPONSIBILITY

Kiev PRAVDA UKRAINY in Russian 28 Aug 85 p 4

ZHUKOVSKIY, Ya., PRAVDA UKRAINY correspondent, Kommunarisk--Perevalsk--Kiev

[Abstract] On May 19, 1984 the medical emergency service (Skoraya pomoshch) in Kommunarisk responded to a call from Aleksey Aleksandrovich Kutuzov, dispatching an ambulance with the physician Valeriy Borisovich Popov. Because of a 'temporary' illness, Popov was unable to ascend the staircase to Kutuzov's apartment and, as a result, Kutuzov's wife was 'treated' by a medical assistant and a nurse. Kutuzov's wife died of an injection administered by the assistant. It turned out later that Popov was inebriated at the time of the call and that the assistant had given the impression that he was a physician. To top it all off, the nurse 'assisting' him was not a regular emergency nurse. To make a long story short, the medical emergency service attempted to cover up the whole incident by falsifying documents and records of the call; falsified or doctored records were also prepared by another physician, Dulin, who arrived in a second ambulance upon the death of Kutuzov's wife. The local prosecutor's office didn't seem too concerned about the entire matter either, and eventually Popov got off with two years of corrective labor at twenty percent of his base pay. The whole case has been reviewed by the Supreme Court of the Ukrainian SSR, found unsatisfactory, and referred to the local prosecutor's office in Perevalsk for further investigation and prosecution. But, somehow, the entire affair has now come to have a 'déjà vu' quality about.  
[015-12172/5915]

#### LAUDABLE MEDICAL CARE IN TAJIK CAPITAL

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 7 Aug 85 p 3

SHAGALOV, Ye., candidate of historical sciences

[Abstract] The quality of medical service at the Dushanbe Gastroenterological Institute is highlighted. This institute was organized in 1963 under the direction of Professor Kh. Kh. Mansurov; it was the first institute of its kind in USSR. Its early diagnostic efforts were remarkable: one in 170 gastroenterological problems was caught in early stages and all timely-diagnosed patients survived for 10-15 years after radical treatment. Considerable

attention is given here to mathematical modelling which, in conjunction with clinical, laboratory and instrumental data, are used in treatment design for specific patients. The work of Tajikistan's gastroenterologists has been acknowledged by domestic and foreign scientists at various international meetings.

[013-7813/5915]

#### PRINCIPAL MEDICATION PUBLIC HEALTH

Moscow PRAVDA in Russian 14 Sep 85 p 3

ROMODANOV, A., director of Kiev Scientific Research Institute of Neurosurgery, delegate to Supreme Soviet of USSR, Hero of Social Labor, academician of USSR Academy of Medical Sciences; GRANDO, A., Chairman of Department of Social Hygiene and Organization of Public Health of Kiev Medical Institute, professor

[Abstract] Disease patterns change continuously. To control them, it is necessary to combine the efforts of medical personnel and administrators. Also an important aspect concerns automation of the analysis of health status of the workers. Several specific examples have been reported where computerization techniques helped in identifying causes of a disease so that labor loss could be minimized by proper readjustment of working conditions. In mass screenings [dispensarization] computerization is a must. Each investment in hardware and software yields quick returns through savings in productive labor and shorter treatment confinements. Another method of improving health status consists of rest homes and sanitarium use for the workers.

[014-7813/5915]

UDC 616.1/.4-084.3:008

#### ISSUES CONCERNING IMPROVEMENTS IN PREVENTIVE EXAMINATION OF POPULATION AS COMPONENT OF CHIEF THERAPIST'S WORK

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 85  
(manuscript received 27 Feb 85) pp 3-7

ELSHTEYN, N. V., professor, ESSR Ministry of Health, Tallinn

[Abstract] Based on the analysis of activities of the therapeutic service in Estonian SSR, the role of chief therapist was evaluated in respect to his contribution to preventive screenings (dispensarization) of the population at large. Estonia was the first Republic in the USSR in which that screening was introduced in an attempt to prevent acute disease manifestations from converting to the chronic state. An important issue was resolved: the screening role belongs to the public health cadres and not necessarily to the clinicians. Basically, three tasks are in need of proper solutions: 1) decision concerning the population to be covered (healthy and ailing), 2) decision in respect to quality of service and 3) the organizational aspects of screening. Therefore, population screening requires close coordination between the organs of public



health, administration, political and professional organizations. Most individuals underestimate the role of preventive screening. Joint efforts of many socio-political organizations are needed for a successful program.

References 15 (Russian).

[031-7813/5915]

UDC 618.19-006.6-084.3

#### PROPHYLAXIS OF MAMMARY CANCER

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 85

(manuscript received 3 Jan 85) pp 13-16

MAZURIN, V. Ya., candidate of medical sciences, PIKHUT, P. M. and ZHITAR, A.K., Moldavian Scientific Research Institute of Oncology, Kishinev

[Abstract] According to the data of All-Union Mammologic Center, an average breast tumor found on clinical examination is 3-3.5 cm in diameter, one discovered by properly performed self-examination is 1.5-2 cm and a radiologically-detected tumor is 0.5-1 cm in diameter. The self-examination is practiced inadequately and improperly, however. Delay from time of detection of the breast tumor to treatment is on the average 5.4 months. Having discounted mammography as a practical screening method (too expensive and too high an exposure dose, based on the NCI data), the authors propose thermography as a safe and effective screening tool which could lead to identification of high risk population. References 14: 10 Russian, 4 Western.

[031-7813/5915]

UDC 616-057:656.2:313.13

#### MORBIDITY AMONG RAILWAY WORKERS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 85

(manuscript received 15 May 84) pp 29-33

PROKHOROV, A. A., doctor of medical sciences, professor and KUDRIN, V. A., candidate of medical sciences, All-Union Scientific Research Institute of Railway Hygiene, USSR Ministry of Ways of Communication

[Abstract] Evaluation of population health is one of the principal tasks of Public Health. Until now, evaluation of the health status of railway workers covered by treatment and prevention centers of the USSR Ministry of Ways of Communication has not been studied adequately. In the present paper an assessment of their health status was made based on visits to out-patient clinics, hospital admissions and complex medical examinations. The therapeutic and preventive help management depends on medical institutions available at various levels and local approach to health service. The incidence and pattern of morbidity reflect labor conditions and specific organization of medical aid. The study made it possible to evaluate the health status of these workers and to project measures for improving therapeutic and prophylactic assistance in this system. References 9 (Russian).

[031-7813/5915]

## COME BIRTH RATE PROBLEMS IN BULGARIA

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 85  
(manuscript received 26 Aug 85) pp 48-50

PETKOVA, L., candidate of medical sciences

[Abstract] In recent years the demographic situation in Peoples Republic of Bulgaria has been characterized by a regressive-type reproduction, aging population, low birth rate and a shift of the reproductive age to the 20-35 years bracket. Birth rate has decreased in 1981 to 14/1000. To determine how young families solve the problem of their family size, a medical-sociological study was carried out in Varna in 1975 on 11-12 years old families because 89% of such couples considered their families established at that time. Statistical data obtained from this survey were reported indicating that many of the changes could be related to women's participation in the labor force (44.4% of the work force). Only 20.8% of the contacted women expressed the desire to do housework and take care of their families only. The principal motive for working was improvement of their material status. On the average, there are three pregnancies per woman in Bulgaria but many of them are interrupted. Some proposed measures to improve the birth rate include: longer leave of absence after delivery, increased number of day care centers, free drugs and ambulatory care for children up to six years of age and actual financial support for each child. References 10 (Russian).

[031-7813/5915]

## PHYSICAL THERAPY CENTERS IN KURGAN OBLAST

Moscow TRUD in Russian 20 Aug 85 p 2

VOLNOV, V., TRUD special correspondent, Kurgan Oblast

[Abstract] At many of the collective farms in the Kurgan Oblast physical therapy centers have been established, with the result that visits by the workers to the local hospitals and clinics have greatly diminished. Workers visit the centers during their lunch breaks or on the way to or from work, and the net effect has been an increase in morale, wellbeing, and greater productivity as a result of a decrease in sick leave. In addition to physical and vitamin therapies, these centers function also as screening and preventive medicine facilities. To date, 82 such centers have been founded in the Oblast, with anticipation that in the next Five-Year Plan similar facilities will be established at all the collective farms.

[056-12172/5915]

## BRIEFS

**PREVENTION OF ILLNESS--(KazTAG)--**Public health in Kazakhstan is rapidly developing. In this Five-Year Plan, 475 ambulatory-prophylactic institutions and hospitals have been created; there has been an increase of 15,000 hospital beds. The army of medical workers was reinforced with 34,000 physicians, feldshers and nurses. The material and technical facilities of public health has been significantly strengthened, and the most progressive treatment methods are being used.

Preventing illnesses and increasing the level of activity of the Sanitary Epidemiological Service are the guiding principles for the organization of public health. Its problems were discussed at the Fourth United Conference of Hygienists, Epidemiologists, Microbiologists, Parasitologists and Infectious Disease Specialists of Kazakhstan, which took place in Chimkent. The speaker, M. A. Aliyev, minister of health of the Kazakh SSR, and the others who appeared noted the specific advances of the Sanitary Epidemiological Service and hygienic science in decreasing morbidity and temporary loss of people's work capacity. The role of dispensarization [health screening examinations] being conducted is important. Measures for further improvement of public health were discussed, and an exchange of work experience took place.

R. M. Myrzashev, the first secretary of the Chimkent Oblast Executive Committee of the Communist Party of Kazakhstan, appeared at the conference [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 7 Sep 85 p 3] 12794/5915

**FORENSIC PHYSICIANS CONFER--**Forensic medicine units play an important role in the detection of many crimes. Questions of increasing the level of research in this area and improving the quality of their examinations were discussed at the plenum of the board of the All-Union Scientific Society of Forensic Physicians, which was held in Baku. Azerbaijan SSR Minister of Health T. A. Kasumov, opened the conference with his introductory remarks.

The chairman of the board of the society, Professor A. V. Kapustin, commented on the results of the plenum at the request of the Azerinform correspondent.

He said that the main theme of the discussion was improving modern laboratory methods of investigation in forensic medicine. New ongoing weapons engineering has opened up broad prospects for workers in forensic medicine and has demanded the accelerated development of laboratory research. The reports and communications spoke of the necessity for accelerating progress in science and engineering. With the aid of modern devices and computers we should increase the quality of examinations conducted and make them a reliable weapon in combatting crimes against human life and health.

The participants in the plenum also discussed problems of the general state of laboratory service in the country, the perfection of physics-engineering methods of investigation and the investigation of material evidence. The question of wider practical application of biochemical methods in forensic medicine was examined.

The plenum heard accounts of work done this year by Azerbaijan and Turkmen specialists and also the staff collective of the central publication organ of our society, viz., journal SUDEBNO-MEDITSKINSKAYA EKSPERTIZA. Improving the preparation of cadres of forensic physicians was discussed. [Text] [Baku BAKINSKIY RABOCHIY in Russian 5 Oct 85 p 4] 12794/5915

POLYCLINIC ON SATURDAY--The RSFSR Ministry of Health states--in connection with the article "Polyclinic on Saturday" which mentions the serious shortcomings in the operation of polyclinics on Saturdays, which was published in the 12 Jul 1985 issue--that commission inspections have been conducted of the method of operation of public health institutions in the Chuvash ASSR, Orel and Moscow regions. Orders have been issued with concrete measures for regulating the method of operation of ambulatory-prophylactic institutions and with strict punishment for guilty parties. Head of the Orel City Health Department, V. M. Skandchenko, Deputy Chief Physician of the Oblast hospital's polyclinic, V. P. Kosarev, and Acting [i.o.] Chief Physician of Polyclinic No. 2, S. A. Rodionova, were released from their duties. Strict disciplinary action was taken against a number of directors of public health institutions of the region.

Chuvash ASSR Deputy Minister of Health, Yu. G. Mansimov, was severely implicated, and head of the medical sector, G. V. Maksimova, was reprimanded. An order was published for the Main Administration of Health, Mosoblispolkom [Moscow Oblast Executive Committee], by which the chief physician of the Lyuberet Central Rayon Hospital, G. A. Shaposhnikov, was severely reprimanded, and the head of the polyclinic, G. I. Semenova, was released from duty.

The article "Polyclinic on Saturday" and the results of the inspection of the method of operation of public health institutions in the indicated territories were discussed at the board of the RSFSR Ministry of Health, as a result of which an order was issued by which Chuvash ASSR Minister of Health N. G. Grigorev and the head of the Orel Rayon Health Department, M. V. Shirokov, were severely reprimanded and the head of the main Administration of Health of the Mosoblispolkom, V. P. Grinavteva, was reprimanded. [By RSFSR Minister of Health N. Trubilin] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 24 Sep 85 p 2] 12794/5915

/5915

CSO: 1840/055

## VETERINARY MEDICINE

### GASTRO-INTESTINAL AILMENTS OF PIGLETS

Moscow SVINOVDSTVO in Russian No 4, Jul-Aug 85 pp 27-28

VASILYEV, V., VOLOTSKAYA, I., SHIPITSYN, A. and SEMENTSOV, V., Krasnodar Scientific Research Veterinary Station

[Abstract] Gastrointestinal ailments are the most common cause of morbidity in piglets, with viral (transmitted) gastroenteritis of swine (VGS) affecting thousands and leading to death in 80-100% of cases. The present article gives a summary of the course of the disease, which generally ends with extreme dehydration and coma; little temperature changes accompany these symptoms. Research has shown that up to 56.7% of all cases had bacterial origins, often with colibacteriosis, often resulting in almost immediate death in the first day. High importance in reducing mortality is attributed to strict hygienic and other care factors particularly in preparing farrowing sows. The authors believe that symptom-free courses of the disease, leaving unknown carriers, are the key to the continuing health problem. Variations in resistance to the disease have also been noted. Careful screening and care of farrowing sows and use of biological preparations have resulted in significant reductions in mortality.

[2100-12131/5915]



# MODEL OF EXPERIMENTAL PIXUNA VIRUS INFECTION IN WHITE MICE

Moscow VOPROSY VIRUSOLOGII in Russian No 2, Mar-Apr 85 (manuscript received 23 Apr 84) pp 214-215

[Article by N. P. Chizhov and R. I. Luk'yanova, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Text] Use of adequate experimental models of virus-infected animals is an important prerequisite of evaluating the spectrum of action of promising antiviral drugs. In this connection development and use of new experimental models of virus infections comparable or similar in pathogenesis to human diseases have important significance to determining the preventive and (or) therapeutic effectiveness of antiviral drugs [1-4].

Use of live vaccine or attenuated virus strains evoking nonlethal disease in animals has doubtless significance to developing experimental models suitable for evaluating the effectiveness of antiviral drugs. The sole indicator of the infectious process in this case is reproduction of the virus in animal organs.

This study has the objective of developing a nonlethal model of experimental infection evoked by Pixuna alpha-virus and suitable for evaluating the effectiveness of antiviral drugs.

## Materials and Methods

The research was conducted on mongrel white mice weighing 6-8, 10-12 and 16-18 gm. Pixuna virus obtained from the virus museum of the Virology Institute imeni D. I. Ivanovskiy of the USSR Academy of Medical Sciences served as the initial virus-containing material. Nine- to 10-day old developing chick embryos that were infected with virus with a  $10^{-2}$  dilution in a 0.2 ml volume injected into the allantoic cavity were used for accumulation of the mother liquor. After 18 hours of incubation at 7°C the developing chick embryos were viewed beneath an ovoscope with the purpose of picking out dead embryos. Surviving embryos were cut open, and the fetuses were removed and homogenized in a can filled with glass beads. The homogenate was suctioned away, and following its centrifugation for 20-30 min at 3,500-4,000 rpm the supernatant was poured into flasks and used as the virus-containing material. The virus titer corresponded to 5 lg TID<sub>50</sub> (not further identified)/0.2 ml on tissue culture in the case of titration by the direct fluorescing antibody method.

## Results

Because no information of any kind was available on the sensitivity of white mice to infection by Pixuna virus, the disease agent's pathogenic properties were studied using different pathways of administrating the agent into animals of different age (weight). According to the obtained data, white mice weighing 6-8, 10-12 and 16-18 grams were nonsensitive in relation to all studied pathways of their infection by virus at a dose of  $10^5$  TID<sub>50</sub>/0.2 ml. Throughout the entire observation time (14 days) no signs of illness of any kind were noted in the animals. On this basis it may be concluded that Pixuna virus is apathogenic in relation to white mice when administered by different infection pathways.

In order to study the possibility of virus reproduction in the organs of white mice, experiments were carried out on animals weighing 16-18 gm infected intranasally. Animals were infected under mild anesthesia with Pixuna virus at a dose of  $10^6$  TID<sub>50</sub>/0.2 ml. Three mice were killed 24, 48, 72, 96, 120, 144 and 168 hours after infection respectively, and their organs (lungs, spleen, brain) were extracted. A 10 percent suspension was prepared from these organs and subjected to titration on VNK-21 cell culture using the fluorescing antibodies method.

Dynamics of Accumulation (TID<sub>50</sub>/0.2 ml) of Pixuna Virus  
in Organs of White Mice Infected Intranasally

| (1)<br>Орган         | (2) Срок после заражения, ч |      |      |      |      |     |     |
|----------------------|-----------------------------|------|------|------|------|-----|-----|
|                      | 24                          | 48   | 72   | 96   | 120  | 144 | 168 |
| Головной (3)<br>мозг | 0                           | 2.67 | 3.5  | 3.5  | 2.67 | 1.0 | 0   |
| Селезенка (4)        | 1.67                        | 4.0  | 4.8  | 3.0  | 2.0  | 1.2 | 0   |
| Легкие (5)           | 0                           | 1.0  | 0.67 | 0.67 | 0    | 0   | 0   |

### Key:

- |                             |           |
|-----------------------------|-----------|
| 1. Organ                    | 4. Spleen |
| 2. Time after infection, hr | 5. Lungs  |
| 3. Brain                    |           |

The dynamics of Pixuna virus accumulation in the organs of white mice are shown in the table. The earliest (beginning 24 hours after infection) and most intense accumulation of virus was observed in the brain and spleen. The reproduction peak was noted in these organs 24 hours after infection; titers of 3.5 and 4.8 lg TID<sub>50</sub>/0.2 ml were accumulated in the brain and spleen respectively. At later times the virus titer in these organs declined gradually, with the virus disappearing completely 168 hours after infection. Reproduction of the virus in lungs was insignificant, and its titer did not exceed 1 lg TID<sub>50</sub>/0.2 ml throughout the entire observation time.

## Discussion

Asymptomatic infection evoked by intranasal infection of white mice with Pixuna virus is characterized by intensive reproduction of the virus in the brain and spleen of animals. Virus reproduction is noted early on in these organs, and accumulation of the disease agent attains maximum titers 72 hours after infection. This model of nonlethal disease in white mice evoked by Pixuna alpha-virus may be used to evaluate the effectiveness of antiviral preparations and interferon inducers. The main criterion in this model for evaluating the effectiveness of antiviral preparations will be their influence upon virus reproduction in the spleen and brain.

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CSO: 1840/020

EXPERIMENTAL EVALUATION OF PATHOGENICITY OF DIFFERENT VARIANTS  
OF LASSA VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 85 (manuscript received  
17 Sep 84) pp 454-457

[Article by A. S. Vladyko, L. Ye. Surikova, T. A. Vovk, I. A. Cherednichenko  
and A. V. Torop, Belorussian Scientific Research Institute of Epidemiology  
and Microbiology, Belorussian SSR Ministry of Public Health, Minsk]

[Text] The arenavirus family includes 11 representatives, of which Lassa, Machupo and Khunin belong to the highly pathogenic group. Research conducted with this group of arenaviruses is limited because work with these viruses must be conducted in special installations providing for a high class of protection. It is obvious from the available information that research is being conducted chiefly with the less-pathogenic representatives of this family, and particularly with lymphocytic choriomeningitis (LCM) virus.

One of the important directions of research on arenavirus infections is concerned with the problems of their attenuation--acquisition of both nonpathogenic viruses and viruses with reduced pathogenicity. In this case searching for characteristics (markers) by which the degree of attenuation of the infectious agent could be evaluated has great significance. It was established using LCM virus as an example that a phenotypic characteristic such as plaque morphology can be used as such a marker [6]. In this case the authors discovered that the color of plaques in viruses that do not evoke death of newborn mice differs from the color of plaques created by the initial virus; these were called "turbid" plaques, while the initial variant formed "clear" plaques and evoked death of newborn mice. At the same time this problem has not been conclusively solved yet because, in another communication, a dependence between plaque phenotype and pathogenicity was not discovered in LCM virus [7].

There is no such information available today for the highly pathogenic group of arenaviruses.

In our research, using Lassa virus we tried to demonstrate the presence of a dependence between plaque phenotype and pathogenicity. We also accounted for the possibility of reducing pathogenicity by conducting a number of passages of the virus in cell culture and in animals. Plaque size served as the phenotypic characteristic of attenuation of Lassa virus.

Three different variants of the virus were used in the work: 1) standard virus that had undergone one passage in Vero cell culture and four passages through newborn white mouse brain (the initial variant); 2) virus that underwent 10 passages in Vero cells and 8 passages through mouse brain (variant 10); 3) small-plaque clones of Lassa virus isolated by the method of triple plaque-to-plaque cloning from variant 10 (variant 11k).

#### Materials and Methods

We used Lassa virus (Sierra Leone strain) obtained from the Virology Institute imeni D. I. Ivanovskiy of the USSR Academy of Medical Sciences. The virus was passaged in Vero cells, the infection multiplicity was 0.001 PFU/cell, and infected cells were incubated at 37°C for 72 hr. Medium 199 containing 2 percent embryonic calf serum served as the liquid overlay. Newborn mongrel white mice were also used to passage the virus; the animals were infected in the brain. Titration was carried out by the plaque method on Vero cells [1].

The pathogenicity of Lassa virus was determined on guinea pigs weighing 300-350 gm and on mongrel white mice weighing 6-8 gm. The mice were infected at a dose of 300 PFU per mouse, while guinea pigs were infected at a dose of 3,000 PFU.

Lassa virus was cloned by the "plaque-to-plaque" method [3].

Presence of temperature-sensitive mutants in the Lassa virus clone (variant 11k) was determined from the decrease in virus titer during growth at non-permissive temperature (40.5°C) in comparison with the virus titer at a permissive temperature (35.5°C); the decrease was assumed to be significant (it was assumed that a temperature-sensitive defect existed) when the titer decreased by 2.0 lg PFU/ml and more [5].

Homologous interference was effected by the method described in [2], without any kind of modifications.

The indirect fluorescing antibodies method was carried out in accordance with the procedure described in [4] using, as the antigen, infected monolayer cultures of Vero cells fixed with acetone.

#### Results and Discussion

We know from the literature [6,7] that arenaviruses, and particularly the LCM virus, produce plaques of varying morphology when titrated in cell culture beneath a dense cover. It was found from further study of these plaques by the cloning method and from investigation of their behavior in animals that in a number of cases differences are observed in their pathogenicity toward sensitive laboratory animals, and that a positive correlation exists between plaque phenotype and pathogenicity [6]. Lassa virus also forms plaques of varying morphology, but in our research we used plaque differences based not on color but on size.



As is evident from Figure 1a, the initial virus produces plaques of varying size when titrated beneath a dense agar cover. A similar type of plaques was noted for virus that had undergone a large quantity of passages (variant 10) in cell culture and in animals. Figure 1b shows a small-plaque clone of Lassa virus (variant 11k) that differed from the two preceding variants in that only one type of plaque was produced (only small plaques formed). This clone was obtained from variant 10 by the plaque-to-plaque cloning method. The small-plaque phenotype of this clone persisted through five passages during growth in Vero cell culture at a low infection multiple.



Figure 1. Morphology of Plaques Formed by the Initial (a) and Small-Plaque (b) Variants of Lassa Virus

Table 1. Lethality of Different Variants of Lassa Virus in Relation to Guinea Pigs and White Mice

| Virus Variant | Passage History* | Titer in Fluorescing Antibodies Method** | Lethality, % |                   |
|---------------|------------------|--|--------------|-------------------|
|               |                  |  | Mice (n=20)  | Guinea Pigs (n=6) |
| Initial       | 1V4M             | 1:256                                    | 60           | 66.7              |
| 10            | 10V8M            | 1:128                                    | 55           | 50                |
| 11k           | 11V9M            | 1:128                                    | 0            | 0                 |

\* M--passage through newborn mouse brain; V--passage on Vero cell culture. Variant 11k was obtained from variant 10 by the "plaque-to-plaque" cloning method followed by one-time passage of a small-plaque clone in Vero cell culture and through newborn white mouse brain.

\*\* Cells infected with different variants of Lassa virus were processed with serum obtained against the initial variant.

These variants of Lassa virus were studied with the purpose of determining their pathogenicity in relation to sensitive laboratory animals. As is evident from Table 1, the initial virus and variant 10 were identically pathogenic to guinea pigs and white mice. The initial virus evoked 10 percent mortality among mice and 66.7 percent mortality among guinea pigs, while the figures for variant 10 were 55 and 50 percent respectively. At the same time the small-plaque clone did not evoke death among the animals.

It was hypothesized that differences may exist in antigen-specific properties of the small-scale variant in comparison with the initial virus. But investigation of antigen-specific properties by the indirect immunofluorescence method showed that when serum obtained against the initial variant is titrated on cells infected with the three variants (see Table 1), the differences in the titers are insignificant, varying from 1:128 to 1:256.

In subsequent research we attempted to confirm this hypothesis, using the small-plaque variant as the antigen to protect animals sensitive to Lassa virus against lethal doses of the initial virus. As is evident from Table 2, the initial virus elicits a mortality of 60 percent in mice and 66.7 percent in guinea pigs (the control groups of animals). Prior to administration of standard (initial) virus, the small-plaque variant was injected twice into experimental groups. It was found that preliminary administration of the small-plaque variant of Lassa virus to animals reduces mortality caused by the standard virus (mortality was 15 percent for mice, while no deaths were noted among guinea pigs). In addition, a more-detailed analysis of the presence of antigenic changes in this clone would require use of other approaches employing monoclonal antibodies or hyperimmune serums [8].

In subsequent experiments we tried to answer the question as to the causes behind reduction of pathogenicity of the small-plaque clone of Lassa virus. With this purpose we conducted research in two directions: revealing presence of a temperature-sensitive defect in this clone, and revealing presence of defective interfering (DI) particles, inasmuch as participation of both ts-mutants and DI-particles in reduction of pathogenicity in relation to sensitive laboratory animals may be hypothesized.

In order to determine presence of the ts-defect, the small-plaque variant of Lassa virus was titrated by the plaque method, followed by incubation of one group of flasks at 35.5°C and a second group (similar) at 40.5°C [5]. As is evident from Figure 2, the small-plaque clone of Lassa virus exhibited insensitivity of identical degree as that of the standard virus when incubation was carried out at higher temperature. The virus titers varied from 5.3 to 6.0 lg PFU/ml, with the 40.5°C virus titers being somewhat higher. The obtained data indicate absence of temperature-sensitive mutants in the population of the small-plaque clone.

When we carried out experiments to determine presence of DI-particles in the small-plaque variant of Lassa virus we found that when it was titrated by the plaque method, this virus produced high titers comparable with the titers of the initial virus (6.0 lg PFU/ml) and that it did not interfere with the initial virus in homologous interference experiments. It follows from these

Table 2. Protective Activity of the Small-Plaque Clone of Lassa Virus in Research on Mice and Guinea Pigs

| Animal Group*  | Animals     | Number Dying/<br>Number in Experiment | Day of Death<br>(Average) | Lethality,<br>% |
|--|-------------|---------------------------------------|---------------------------|-----------------|
| Control<br>(physiological solution + standard virus) | Mice        | 12/20                                 | 8.1                       | 60.0            |
|  | Guinea pigs | 4/6                                   | 19.5                      | 66.7            |
| Experimental<br>(variant 11k + standard virus)       | Mice        | 3/20                                  | 6.3                       | 15.0            |
|  | Guinea pigs | 0/6                                   | -                         | 0               |

\* Physiological solution and the small-plaque clone of Lassa virus were administered to the control and experimental groups respectively, twice with an interval of 28 days prior to injection of standard virus. Animals of the experimental group were immunized with small-plaque clone (variant 11k) subcutaneously at doses of 300 and 3,000 PFU for mice and guinea pigs respectively. Standard virus was administered 14 days after the last injection. The observation time was 35 days following administration of standard virus.

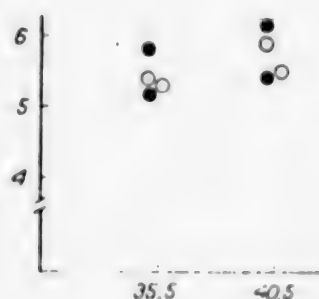


Figure 2. Investigation of the Presence of ts-Defect in the Small-Plaque Variant of Lassa Virus: Filled circles--initial virus; empty circles--small-plaque virus. Ordinate--virus titer (lg PFU/ml); abscissa--incubation temperature (°C)

data that the reduction in pathogenicity of the small-plaque clone is apparently not associated with presence of DI-particles either.

Thus passage of Lassa virus in Vero cell cultures and through newborn white mouse brain for 10 and 8 passages respectively does not reduce pathogenicity in relation to sensitive laboratory animals (guinea pigs and white mice).

The obtained data provide some basis for hypothesizing that virus variants with reduced pathogenicity may be isolated from a population of Lassa virus by the plaque-to-plaque cloning method.

The decrease in pathogenicity of the small-plaque clone of Lassa virus is apparently not associated with presence of temperature-sensitive mutants or DI-particles.

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CSO: 1840/023

UDC 578.833.27:578.74].083.3

STANDARDIZATION OF CONDITIONS FOR MEASURING INTENSITY OF SPECIFIC  
FLUORESCENCE IN CONTINUOUS CELL CULTURES INFECTED WITH VARIANTS OF  
JAPANESE ENCEPHALITIS VIRUS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 4,  
Apr 85 (manuscript received 13 Jul 84) pp 57-60

CHEREDNICHENKO, Yu. N., Institute of Virology imeni D. I. Ivanovskiy, USSR  
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[Abstract] Both Soviet and non-Soviet scholars attribute great significance to luminescent microscopy as a method for studying pathogenesis of human and animal viral infections. The present article reports on study of the dynamics of the intensity of imposed fluorescence of marked antibodies tied to the antigen of Japanese encephalitis in vitro. Cells of various origins were tested by a passive fluorescent antibody method. Procedures for standardization and perfection of methodology and statistical calculations (using the student criteria) are summarized. A direct linear correlation was found between pathogen activity of Japanese encephalitis and the intensity of imposed fluorescence of marked antibodies. Continuous Viro and L<sub>929</sub> cell cultures were regarded to be more suitable models for registering induced fluorescence than was the HeLa line. Figure 1; references 11: 8 Russian, 3 Western.  
[2094-12131/5915]



## CONFERENCES

### INTERNATIONAL SYMPOSIUM ON HYPERBARIC OXYGENATION

Moscow MOSKOVSKAYA PRAVDA in Russian 3 Oct 85 p 2

[Text] A symposium on hyperbaric oxygenation began yesterday at the All-Union Surgery Research Center of the USSR Academy of Medical Sciences.

Academician B. V. Petrovskiy, chairman of the symposium, told our correspondent: "The closest kind of connection exists between medical science and practice and scientific-technical progress and the introduction of its achievements in health care. Thanks to this, it has become possible to create a promising new direction of clinical medicine--hyperbaric oxygenation, which is based on the use of oxygen under high pressure, for purposes of therapy. In recent years, this method has been introduced broadly into practice and is being used effectively in various fields of medicine: surgery, therapy, ophthalmology, obstetrics, pediatrics and neurology."

Participants in the symposium are sharing experience in this field and are outlining plans of cooperation. Soviet specialists are taking part in the symposium's work together with medical personnel from Bulgaria, Hungary, the German Democratic Republic, Cuba, Mongolia, Romania, Czechoslovakia, the United States, and the Federal Republic of Germany.

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## ALL-UNION CONGRESS OF INFECTIOUS DISEASE SPECIALISTS

Taskhent PRAVDA VOSTOKA in Russian 26 Sep 85 p 2

[Text] The Second All-Union Congress of Infectious Disease specialists opened in Tashkent on September 24. Leading scientists and medical personnel of the country will summarize results of work that has been done in recent years, discuss timely problems of diagnosing and treating infectious diseases, examine ways of fundamentally improving medical services to the population, and exchange experience.

Papers were given at the opening of the conference by P. N. Burgasov, USSR deputy minister of public health; V. I. Pokrovskiy, member of the USSR Academy of Medical Sciences and director of the Central Scientific Research Institute of Epidemiology; I. K. Musabayev, corresponding member of the USSR Academy of Medical Sciences and member of the Uzbek Academy of Sciences; and other scientists.

Much attention is being devoted at the congress to tasks for implementing a program for improving medical services to the population in the light of demands of the 26th Congress of the Communist Party of the Soviet Union and of subsequent plenums of the Party's central committee. It was noted that much work on improving methods of preventing, diagnosing and treating diseases has been done in our country in recent years. At the same time, speakers emphasized that new methods for fighting dangerous diseases are expected from scientists by the medical profession. The material and technical resources of medical institutions do not meet present-day requirements everywhere. The training of medical personnel needs to be improved greatly.

Recommendations aimed at overcoming existing shortcomings and at introducing achievements of science and advanced experience into medical practice as quickly as possible will be formulated at the congress.

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OFFICERS ELECTED AT INFECTIOUS DISEASE SPECIALISTS' CONGRESS

Tashkent PRAVDA VOSTOKA in Russian 27 Sep 85 p 2

[Text] The Second All-Union Congress of Infectious Disease Specialists completed its work in Tashkent on September 26. Delegates from all of the Union republics discussed a wide range of questions connected with the diagnosis, treatment and prevention of diseases, and they exchanged experience. Particular attention was devoted to accelerating the introduction of scientific achievements into medical practice, and to seeking effective ways of combating diseases and improving the performance of medical institutions.

A new charter of the All-Union Society of Infectious Disease Specialists was adopted at the congress. Elections of new members of the society's board were held. V. N. Nikiforov, corresponding member of the USSR Academy of Medical Sciences, was elected chairman of the board.

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CSO: 1840/062

CONGRESS OF HEMATOLOGISTS AND TRANSFUSIOLOGISTS

Kiev PRAVDA UKRAINY in Russian 19 Oct 85 p 3

[Excerpt] L'vov October 18--Problems of blood donorship and new scientific and organizational principles for rendering special medical care were discussed at the Second All-Union Congress of Hematologists and Transfusiologists, which completed its work here today. Prominent Soviet medical scientists and guests from countries of the socialist countries took part in plenary and section meetings of the congress.

FTD/SNAP

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CSO: 1840/111

## MISCELLANEOUS

### ECONOMICAL PROCESS FOR GROWING SEAWEED AS BIOMASS FUEL SOURCE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Oct 85 p 4

[Article by V. Lagovskiy]

[Excerpt] Calculations made by researchers of Moscow State University (MGU) have shown that the Aral Sea is capable of providing [biomass] energy for almost the entire country.

An experimental unit for 'growing' such energy already exists. This unit, which is called "Biosolyar", was shown to me in the university's hydrophysics laboratory.

"Up to 40 liters of fuel gas a day can be gathered from a single square meter of our plant beds," claimed Candidate of Biological Sciences M. Lyamin, head of the laboratory. "Seaweed yields biomass, which we place in special vats. There it is eaten by bacteria, which release methane."

Units for producing biogas are already operating in our country and abroad. They convert waste products of agriculture into methane by fermentation. The MGU scientists are proposing that biomass be specially grown. It must be constantly nourished, watered and fertilized, however. In short, a considerable amount of energy is consumed here, too. Won't this result in a negative balance?

"Our plantations have to be 'fertilized' only once, at the very beginning," explained Doctor of Physical-Mathematical Sciences V. Alekseyev, the project director. "Seaweed will grow on the surface of the sea, in floating plastic pans. We shall put a solution containing potassium, phosphorus, nitrogen and trace elements--all of the necessary nutrients--in these pans and start the system operating; the plants will then begin to multiply. When the biomass reaches a certain weight, automatic equipment will go into operation and a portion of the seaweed will be pumped out through pipelines, to feed bacteria that generate methane. They will process the plants and release methane. But all of the nutrients will be retained in the fermented mass; it will be necessary only to return it to the pans. The cycle will be complete."

In the laboratory, I was shown a map on which the most advantageous places for plantations were marked in the tropical zone of the oceans. More than 300 billion tons of conventional-fuel equivalent could be gathered from such



plantations--15 times as much as mankind will need in the year 2000. And the cultivation of energy plantations could begin as soon as tomorrow. Incidentally, could this be done elsewhere than on the sea?

"It would not be expedient on dry land, because ground plants develop too slowly," said M. Lyamin. "In water, we can accelerate this process--heighten its efficiency."

Studies have shown that photosynthesis proceeds much faster if plant cells are periodically in the shade. On dry land, they have to be specially shaded, but on the surface of the ocean, tiny water plants, each consisting of only a few cells, constantly exchange places with each other in the sun; the waves and wind move them around. Theoretically, the efficiency of microscopic water plants can be 17 times as high as that of any plant on land. But even at the modest efficiency of 6-8 percent that has been achieved so far, scientists estimate the capacity of a single square kilometer of plantation at 15 megawatts.

This idea is already quite suitable for practice. "Biosolyar" units could be built on non-freezing cooling ponds of thermal power stations, for example. Even now, methane gathered with such units would heighten a station's efficiency by almost 50 percent, according to calculations.

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CSO: 1840/111

## VACCINE PROTEINS R & D ON SALYUT-7

Leningrad LENINGRADSKAYA PRAVDA in Russian 13 Oct 85 p 2

CHESANOVA, T.

[Abstract] The article reports on work which the Leningrad Scientific Research Institute of Vaccines and Serums is doing on obtaining extra-pure biological preparations for medical research, using space technology.

Candidate of Biological Sciences Albert Ivanovich Krashenyuk, head of the institute's laboratory of live influenza vaccine, is quoted in regard to space experiments which personnel of the institute have been conducting in collaboration with the Crimean Medical Institute, the Moscow Higher Technical School imeni Bauman, and other institutions. Experiments performed by crews of "Salyut" orbiting stations have been aimed, in particular, at obtaining extra-pure hemagglutinin and other surface proteins of the influenza virus, using the method of electrophoresis. The series of space experiments called "Tavriya" demonstrated that such products can be obtained comparatively quickly and easily in conditions of zero gravity, Krashenyuk related. Commenting on progress in automating the space experiments, he mentioned that a new-generation electrophoretic unit called "EFU-Robot" is now in use on the "Salyut-7" station. This unit was developed by the Institute of Bioorganic Chemistry. The "EFU-Robot" can be programmed by a cosmonaut to select samples of substances purified in the course of experiments and automatically transfer the samples from the unit's working chamber to ampoules, using syringes. Preparations obtained during the current manned orbital mission were delivered to Earth recently by cosmonauts V. Dzhanibekov and G. Grechko.

With regard to the prospective applications of these research results, Krashenyuk mentioned plans for producing immune serums on the basis of extra-pure proteins obtained in space. On the basis of one such serum, Krashenyuk and his colleagues hope to obtain a fundamentally new preparation for diagnosing influenza with high accuracy. These proteins and serums will also serve as standards for monitoring the purity of products of the vaccine institute. It will become possible to evaluate vaccines' hemagglutinin content by weight, for example. Mention is made in this connection of a completely automated line for the production of influenza vaccine which is now in operation at the institute. Specialists of the USSR Academy of Sciences' scientific and technical department developed this line, which is said to have no counterparts in the world.

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## METEOROLOGICAL ADAPTATION RESEARCH AT BIOLOGY INSTITUTE

Moscow TRUD in Russian 26 Sep 85 p 3

KRUSHNELNITSKIY, Ye., interviewer

[Abstract] This article reports an interview with Vladimir Nikolayevich Chernyavskiy, senior science associate of Rostov State University's Biology Scientific Research Institute, regarding research which he and his colleagues have been doing for about 20 years. Chernyavskiy's group has studied natural mechanisms of anticipation of weather changes in animals and human beings, as well as effects of weather conditions on human behavior and working fitness.

In 1971, Chernyavskiy recalls, his group discovered a natural phenomenon which it called 'meteorological sounds'--noise of free atmosphere which is caused by turbulent motion of the air. These sounds reflect properties of the atmosphere in a certain area, including the appearance of new air masses in the upper atmosphere. It is thought that living organisms unconsciously perceive these sounds, analyze them and modify their behavior accordingly.

Meteorological sounds have a frequency range of 2.5 to 15 kilohertz. Needed information on weather conditions is conveyed to an organism by so-called leading meteorological sounds with characteristic frequencies.

Chernyavskiy mentions that the behavior of sheep dogs was observed for four months. Weather forecasts made on the basis of these observations proved to be 92 percent accurate. Human beings are said to be capable of perceiving meteorological sounds up to a distance of 50 kilometers from their source. Chernyavskiy also comments on a hypothesis of human meteorological adaptation which his group has proposed on the basis of its research. According to it, the organism perceives and remembers whole meteorological sound-images which occur at certain intervals in certain localities, as well as corresponding programs for the readjustment of functional systems of the organism.

With regard to practical applications of this work, Chernyavskiy says that a better understanding of the biological forecasting mechanism may lead to the development of improved weather-forecasting methods and equipment. An acoustic weather-forecasting method which his group developed has been used in the Rostov-na-Donu area. Cloudiness and precipitation reportedly have been forecast with accuracies of 98 percent and 85 percent, respectively, using this

method. Chernyavskiy's group has also developed a medical forecasting method using primary data, which is based on the meteorological-adaptation hypothesis. When tested experimentally at a local enterprise, this method proved to be 92 percent accurate, according to Chernyavskiy. Pointing out that ecological factors must also be taken into account in the forecasting and prevention of illnesses, Chernyavskiy calls for organizing comprehensive systems of medical and ecological support for the population in major cities. He mentions that his group has developed a variant of such a system for the city of Rostov-na-Donu.

An appendix to the article records comments of Doctor of Biological Sciences Ye. A. Umryukhin, head of the laboratory of systemic mechanisms of human adaptation of the USSR Academy of Medical Sciences' Scientific Research Institute of Normal Physiology imeni Anokhin, regarding the results of Chernyavskiy's work.

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